



TRANSIT

The May 2011 Newsletter of

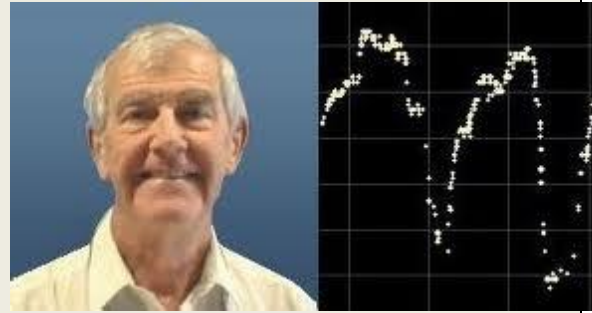


NEXT MEETING

13 May 2011, 7.15 pm for a 7.30 pm start
Wynyard Planetarium

Variable stars

**Roger Pickard, VP of the BAA and
Director of the BAA Variable Star Section**



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Editorial

Rod Cuff



This issue (rather later than usual, for which I apologise) is stuffed to the margins with observational suggestions, reports and photographs. Working roughly outwards, there are artificial satellites, the Moon, Saturn, a star cluster, spiral galaxies and a couple of particularly pleasing 'firsts'.

The first first is a pair of images of a distant supernova, discovered only a couple of weeks ago and now beautifully recorded by Keith and Jürgen working independently. I'm sure that by now all regular readers of *Transit* recognise that both men are now delivering astronomical images that can match anything else produced in the UK with their size of telescopes.

The second first, although in a sense geographically closest, feels almost farthest away – a fascinating and full report by Our Own Australia Correspondent, Dave Weldrake. I've warned him to expect a stream of CaDAS members pretending to go to Oz to visit obscure relatives but actually wanting to elbow him aside from his Takahashi ortho-apochromatic refractor.

To everyone contributing to what almost amounts to a special edition, my sincere thanks. Next month's centrepiece (unless there's a supernova 50 parsecs away) will be a how-I-did-it guide by Keith on building a robust pier system for £65 and quite a few hours' work. Just the project for those long, light summer evenings ...

The copy deadline for the May issue is **Thursday 26 May**.

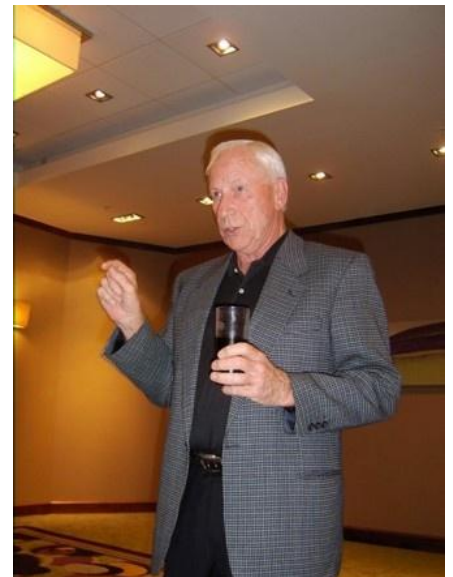
Rod Cuff, info@cadast-astro.org.uk, 1 Farndale Drive, Guisborough TS14 8JD (01287 638154)



Meet an astronaut in Glasgow

Colonel Al Worden, the Command Module pilot of Apollo 15 (which NASA called 'the most successful manned spaceflight ever achieved'), will be involved in several events in Glasgow later this month.

- A **presentation** on **Friday 20 May** at 7:30 pm at Glasgow Caledonian University, including an audience Q&A and a autograph session – autographs are free, although if you want a signed photo of you and Col. Worden, that will set you back £25. Tickets for the evening are £30, or £10 for (accompanied) children.
- A relaxed and informal **Q&A session** the next morning, **Saturday 21 May**, at 10.30 am in the Marriot Hotel Clyde Suite (tickets £30).
- A **wine reception, dinner & dance** (with disco music from the Apollo years!) on **Saturday 21 May** at 7 pm–2 am at Glasgow Marriott Hotel. Tickets are £50, or £22 for accompanied children under 14. You can chat informally with Al, who will also give an after-dinner speech. There



will be a raffle of 'Apollo items', which he will 'personalise on request'.
There's full information about these events at www.walkwithdestiny.com .

OBSERVATION REPORTS AND PLANNING

Skylights – May 2011

Rob Peeling

The Moon

3 May	10 May	17 May	24 May
New Moon	First Quarter	Full Moon	Last Quarter



The Sun

If you have solar filters or know how to project the Sun's image safely, then the Sun is now a fascinating astronomical target as the daylight hours lengthen. As solar maximum approaches, there are now almost always obvious sunspots to be seen. It's worth looking for them if any reach the boundary of naked eye detection **BUT ONLY THROUGH THE PROTECTION OF A SOLAR FILTER.**

As always with the Sun, take NO risks with your eyesight and only use filters that have been tested for pinholes immediately before use. **Don't stare directly at the Sun with your naked eyes** even when it's low in the sky.

The planets

On 11 May **Venus, Jupiter and Mercury** will rise together in the early morning sky. The three planets will be close enough to find together in the dawn light with binoculars or naked eye from the 9th to the 12th or thereabouts. A gibbous Venus is the bright marker for the other two. Between the 9th and 12th Venus swoops beneath Jupiter, with Mercury further west and following more slowly. Jupiter and Venus are at their closest on 11 May.

Saturn remains prominent to the south in the evening beneath the constellation of Leo. On nights with good seeing the dark gap between the rings and the planet (not the Cassini division) can still be seen. The rings will be fully edge-on in August.

Deep sky

Objects in Ursa Major, Canes Venatici and Boötes

The constellations Ursa Major and Canes Venatici are more or less overhead in May, with Boötes well placed also and marked by bright Arcturus. This area of sky is rich in Messier objects.

The **Whirlpool Galaxy M51** and its interacting companion **NGC 5195** are a must-see pair. M51 is visible in binoculars from dark sites. From elsewhere it is easy to track down by star-hopping from Alkaid, the last star in the tail of the Big Dipper. I can usually see it in the finder. This

galaxy was the first to be described as a spiral by Lord Rosse around 1850, using the 6-foot Leviathan of Parsonstown, the largest telescope in the world at the time.

Also near to Alkaid is **M101**, which is a face-on spiral galaxy. It is actually better found, I think, by star-hopping from Mizar rather than from Alkaid. Only go after it if you like a challenge. It has low surface brightness, which makes it **very** elusive with any kind of light pollution. I have detected it from home but I have only ever seen it well from the North York Moors.

As those old favourites, **M81 and M82**, are overhead, now is probably the best time to see maximum detail in them, especially the dark lanes in M82. While in the area, try to find NGC **3077** about 1° to the east and very slightly south of M81. It's a bright galaxy in its own right but eclipsed by the Messier pair, although it's part of the same system.

Also try for **M97, the Owl Nebula** (see right), which I think is the most elusive of the four planetary nebulae in Messier's list. It lies close to Merak, the lower of the pointers in the Big Dipper. Close by is the edge-on galaxy **M108**, which is fairly easy to spot.

Last of the Messier list for now is **M3**, the globular cluster in Canes Venatici. Find this by tracking with your finder roughly half the way along the line from Arcturus to Cor Coroli. It should show up as a fuzzy blob. Use high power to see this cluster resolve into thousands of stars. There is another globular nearby to the east in the Herschel 400 list, **NGC 5466**. I haven't seen it yet but Dave Blenkinsop has put it on my target list for me.

My final suggestion for the month is the interacting pair of galaxies **NGC 4490 and NGC 4485**. These lie just west of β Canes Venaticorum (Chara). NGC 4490, the **Cocoon Galaxy**, is fairly easy to pick up. Its companion NGC 4485 is shy but will be seen in good conditions.



Keith's gallery

Keith Johnson

On 2 April I had a fantastic observing night at Derwent Reservoir, hosted by Sunderland A.S., who had invited members from various societies across the North-East to join them. Members of Sunderland, Durham, Newcastle, South Shields and Northumberland Astronomical Societies took part, as well as CaDAS members.

Observers and imagers were dogged for the first few hours by strong gusts of wind and then passing high cloud. However, at around 2 am the skies eventually cleared and the wind had calmed down.

Here are a couple of test shots. The first is M51 or NGC 5194, the Whirlpool Galaxy in the constellation of Canes Venatici.





I decided to stay in the same constellation for a while. April's *Transit* said 'the early astrophotographer catches the Whale'. I did indeed catch the Whale!!.....and the Pup and The Hockey stick – see below! The Whale galaxy (NGC 4631).has a smaller, fainter galaxy showing above it in this image: The Pup (NGC 4627). Below and to the right is the Hockey Stick galaxy (NGC 4665).



The **equipment** used for this particular test run (sorry, Editor. ...) was the following:

William Optics ZS 66 doublet refractor (acting as the guide scope)
Moonfish 80mm doublet refractor (imaging telescope)
William Optics 0.8x field flattener
Skywatcher HEQ5 Pro mount
LV1 (stand-alone autoguider.)
Modified Canon 1000D DSLR

I've been installing and painting a new pier set-up for my equipment¹, and was eager to try out the kit on Saturn. Here's a selection of images captured on 1 May from 22:00 onwards that clearly show the storm that you've probably all heard about.



¹ [See the Editorial on p.2 – more on Keith's pier project in June's issue. – Ed.]

Each image is the result of a 3-minute AVI captured at 10 frames per second using AVI-IO software, with later image processing carried out in Registax 5.

Equipment:

- Skywatcher EQ6 Pro mount
- Celestron C9.25" O.T.A.
- 2.5x Powermate
- ToUcam Pro.2 webcam
- Infrared blocking filter



A supernova in Ursa Major

Keith Johnson & Jürgen Schmoll

On 28 April a supernova was discovered in the galaxy NGC 3972 in Ursa Major (RA: 11h 56m 23s, Dec: +55° 15' 25"). When we learned of this, we each succeeded in imaging it on the night of 3–4 May.²

Keith's (negative) image, shown on the next page, was captured using the same hardware as for the M51 and Whale/Pup/Hockey Stick images in the previous article.



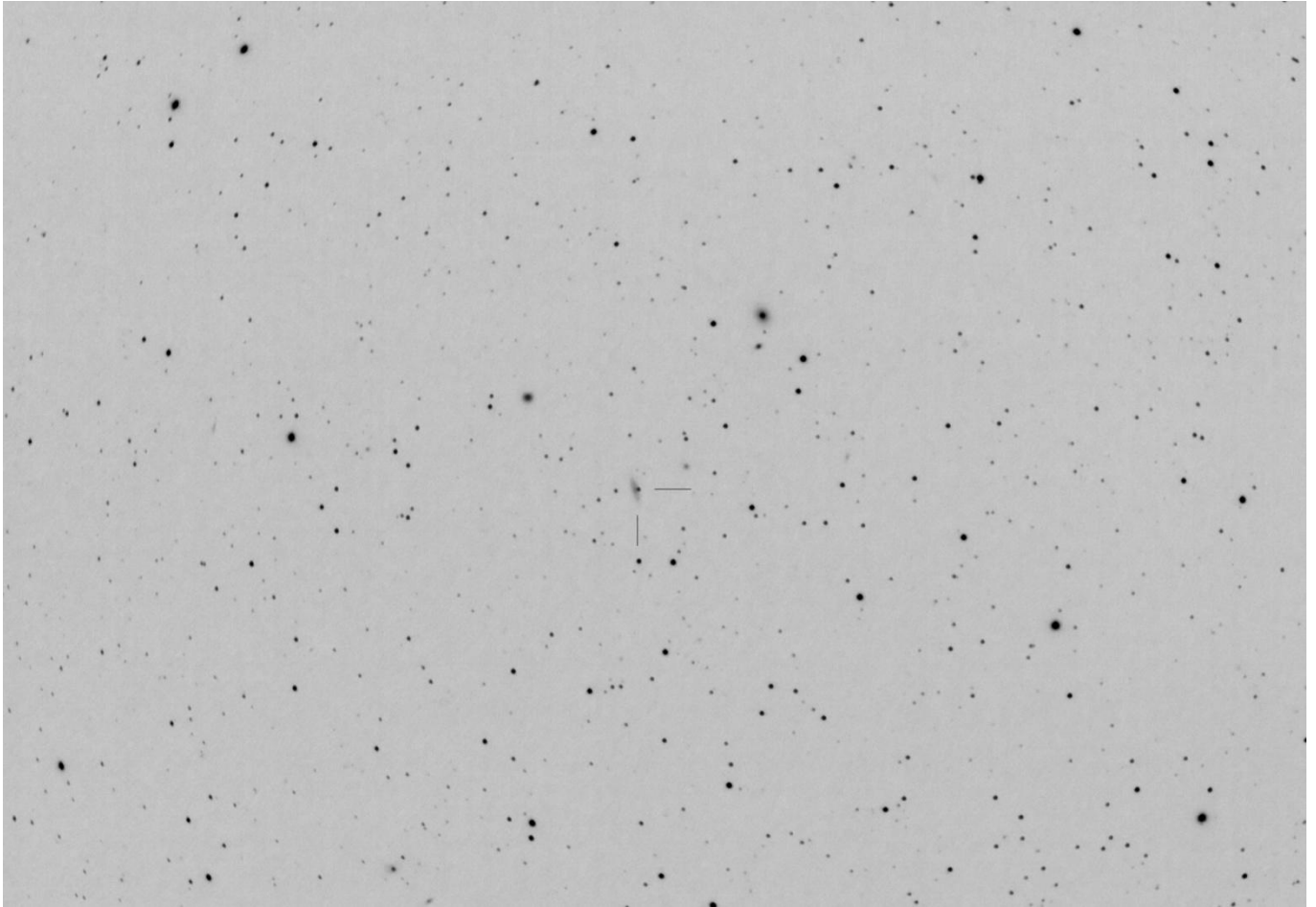
Exposures:

- 8 × 5 min. light frames
- 10 × 5 min. dark frames
- 8 × bias frames
- 10 × flat frames

Software:

- Aligned and stacked in DeepSkyStacker.
- Image cropped and inverted in Adobe Photoshop CS2.

² [As far as I can see from discussion on the web, the supernova that night was about mag. 13.3. – Ed.]



Part of Jürgen's image, captured 'from what is probably the largest observatory in West Cornforth ☺', is shown on the next page.³

Hardware:

200/1000 Newtonian with coma corrector
Modified Canon EOS 40D camera
Astronomik CLS filter
NEQ6 Pro mount

Exposures:

33 x 4 mins @ 1600 ISO, unguided

³ *[Jürgen's was a full-field positive image, but showing it that way here didn't do justice to the detail of the supernova and its surroundings. I've taken the liberty of inverting it, rotating it to match Keith's, and cropping it, so that the supernova and some of the other galaxies in the field can be seen at full resolution. – Ed.*



The next step up the learning ladder

Rod Cuff

In the April issue I showed my first experimental effort with the Meade Deep Space Imager III (DSI III) camera, on part of the Persus Double Cluster. This month I've been getting better at framing, focusing, exposing and processing shots and have changed the software I use for post-processing. Here's my best effort so far, from 11 April – an image of M37, a splendid open cluster (mag. 5.6) in Auriga. At full resolution, the large number of faint red stars can be easily seen. However, there is some star bloat, probably because I wasn't using an IR blocking filter.



Equipment:

Meade LX90 8" SCT

0.63x reducer/field-flattener, giving a focal ratio of f/6.3

DSI IIIc camera (2 x 30 sec – further exposures were disturbed by gusts of wind)

Captured with Envision software (since then, I've switched to Nebulosity)

Post-processed with Nebulosity software and Photoshop CS2

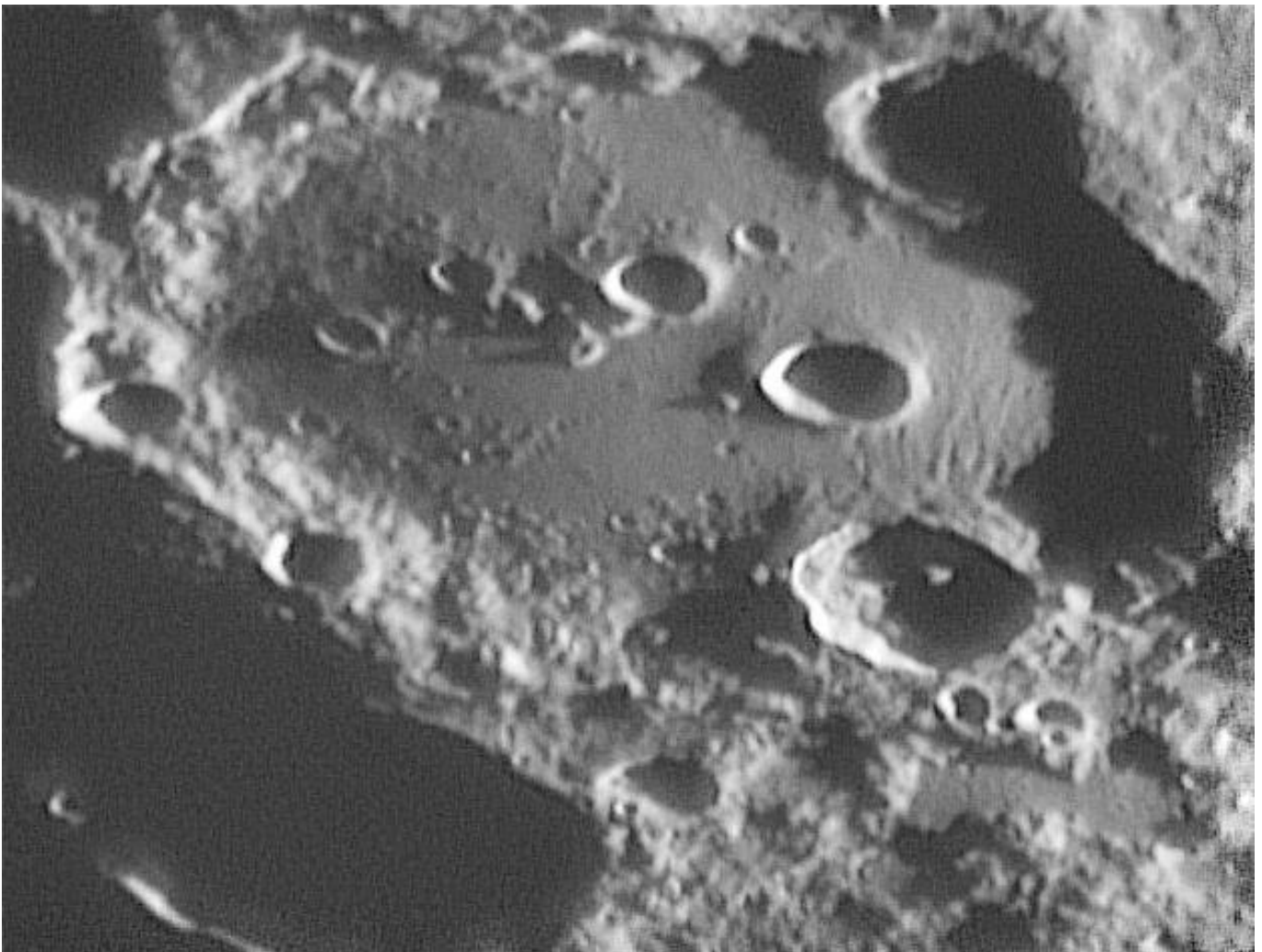


Walled plains on the Moon

Malcolm Bannister & Jack Youdale

[Words by RNC] Here are a couple of images Malcolm and Jack created together a while ago of well-known features on the Moon.

The first is of Clavius, the third-largest crater on the visible side of the Moon, a walled plain with a diameter of 225 km. It's in the southern highlands, to the south of the well-known bright ray crater Tycho. From Earth it always looks foreshortened because of its position near the limb.



The other is of an even better-known crater, the great walled plain of Plato. With a diameter of 101 km, it's considerably smaller than Clavius, but there is something very satisfying about its circularity (though foreshortened again) and the relative smoothness of its lava-flooded floor.



[A night in April](#)

Dave Weldrake

On 1 April 2011, I moved into my first home in Bungendore, NSW, Australia. A small country town with a population of 1500, Bungendore is 30 km east of Australia's capital city, Canberra. I commute to work in the city every day, which used to take 30 minutes from my rented apartment in the northern Canberra suburb of Bruce, and, despite being about five times further away, now takes only 10 minutes longer, as the highway is devoid of traffic lights and the usual rush-hour crush. A ten-minute-longer commute is well worth it, as Bungendore offers a wonderfully quiet relaxed lifestyle, large rural blocks of land on which to live and, best of all, very little light pollution.





In mid-2010, I treated myself to a Takahashi TOA-130NS ortho-apochromatic refractor (see *left*)⁴. After many years of striving to obtain as good an optical image as I could, I decided to take the plunge and buy one of these masterpiece refractors. Living in Bruce, all I had was a small balcony from which to observe, and all I could see was a small strip of sky towards the north.



Despite this, I had superb views of Mercury, Venus, Mars, Jupiter, Saturn and Uranus from the balcony, even managing to spot quite distinct shadings on the terminator of **Mercury**, and martian maria when **Mars** was only 6 arcseconds across. **Venus** was a featureless white crescent, with no false colour at all. The rusty colour of **Jupiter's** belts was very impressive, as were seeing the moons as little balls on a regular basis. Ganymede in transit was large and dark grey, and Europa a brilliant white. The Great Red Spot was a vivid orange – the colour transmission of the Takahashi is superb. The future looked bright for many more memorable sights with the new telescope, if only I could use it from a dark-sky site with little obstruction from neighbouring buildings. When I moved to Bungendore, I got my wish.

The April skies in Australia are very impressive. Although lacking mid-winter's zenithal Sagittarius, April allows Orion to be seen after sunset, with Sirius very high in the sky, Canopus not far behind, the Southern Cross rising and Scorpius appearing later with its associated massive star-clouds. A great variety of objects can be seen in April, and, as luck would have it, that would be my introduction to back-garden observing in rural NSW.

The night of 9 April was very clear, with a thin crescent moon towards the west as the Sun set. I decided to setup my telescope and try for some deep-sky objects, a class of object I had had very little opportunity to view from my old balcony. I left the telescope set up in the garden for an hour to cool down as the sky grew darker. Australia has some wonderful sunsets, and that night

⁴ [The telescope shown is someone else's Takahashi TOA-130, but you get the general idea ... – Ed.]

was no exception, but the most noticeable difference from English skies is the sudden change from twilight to darkness. Twilight is very short in Australia, and in the space of 20 minutes can go from relative brightness to total darkness.

As I first went outside, Orion was very bright and starting to settle towards the West. Sirius shone brilliantly, and showed very little twinkle, a sure sign that the sky was steady. I first looked at the **Orion Nebula**, to re-align the finderscope. The nebula was very impressive at 40x, forming what looked like a complete loop around the bright central region. At 280x and with a little patience I could see six of the Trapezium stars.

I thought I would try for an object that I had seen only once before, from the Allenheads star party about 15 years ago. The object was the **Flame Nebula**, which is the brightest part of the nebula complex that contains the Horsehead Nebula. The Flame lies right next door to the left-most star in Orion's Belt (the right-most star as seen from Australia – see the unfamiliar Southern Hemisphere view of Orion below!). I put in my 40x eyepiece and had a look. I could



see the Nebula with averted vision as a large patch of vague diffuse light. By watching some more, I could make out a dark channel running through the middle of it. I had thought seeing the Flame was impossible without a filter, but this object is easier to see than most people assume, if the sky is dark and clear. There was no sign of the Horsehead, but seeing it unfiltered would be pretty much impossible with a 5" aperture. Next summer, when Orion is high, I shall nevertheless give it a go.

As the sky was steady, I next moved on to **Sirius**. I've never been able to split Sirius, despite trying many times. I recently read an article about its visibility, greatly improved now because the orbit of Sirius B has increased its separation from the primary, to all of 12". On a previous night I split **eta Geminorum**, with difficulty; it's a double star with 1.5" separation and a 3.5 magnitude brightness contrast. I thought I would have a good chance of finally seeing 'The

Pup'. I tried with my 210x eyepiece, and then with the 280x, allowing Sirius to float through the field of view while scrutinising every apparent speck of light around its disk to try to see Sirius B. I looked for about 20 minutes, but had no luck. I didn't see anything that would convince me I'd seen it. Once again The Pup had eluded me, but one day I'll get it.

Next I moved onto Crux, and looked at the **Jewel Box Cluster** at 40x, very impressive with red and blue stars interspersed on a rich Milky Way background. I always think this cluster is overly advertised, and personally find **M37** or the **Double Cluster** in Perseus to be more impressive, despite the coloured stars. The Jewel Box is very small in the eyepiece.

Alpha Centauri was my next target, which I viewed at 210x. Both stars shone down like a pair of torchlights, and they always remind me of a pair of eyes looking back.

Being in Crux, which is next to Centaurus, the next obvious target was **Omega Centauri**, the brightest and largest globular cluster in the whole sky, Omega Cen is always visually stunning



(see left). Tonight was no exception, and my 77x eyepiece allowed it to fill the field of view completely, and was fully resolved into stars. There is no apparent brightening towards the centre of the cluster (unlike other bright clusters such as 47 Tucanae); rather, Omega Cen is a uniform ball-shaped mass of tiny faint points, thousands upon thousands being seen in one go. Although it's impossible to see colour in Omega Centauri, I always think it looks bluish-green. The cluster also looked squashed along one axis, a product of its rapid rotation. In larger telescopes Omega Centauri is breathtaking, and through my 5" refractor it's gasp-worthy every time, and is very bright through the finderscope.

Further north in Centaurus is the giant galaxy **Centaurus A**, and I moved the telescope to this object next. I was surprised to see it clearly through the finderscope, and the main view at 40x and 77x showed a large diffuse ball of light, rapidly falling off in brightness towards the edge, with a wide black strip running right through the middle. There are many foreground stars towards Cen A, and this again provided a wonderful view.

My *Star Atlas 2000* showed that there were various other fainter galaxies in Centaurus, and I decided to try to see some of these. Never having seen any of them before, it was a mystery what I would find. The first I tried was **NGC 4945**. I slewed the telescope and put in my 40x eyepiece. Immediately visible was a long thick smudge, covering most of the field of view (around half a degree). It looked like a fat cigar, with a smattering of a few stars here and there. *Burnham's* lists this object as magnitude 9.2, and a full 15 x 2.5 arcminutes in size. It was a big surprise to see it so clearly. Nearby was a small, much fainter, rounded smudge, which the map revealed to be **NGC 4976**, probably a companion galaxy of the far bigger 4945.

Emboldened, I tried **NGC 5011**, which lies in a V-shaped asterism close to Centaurus A. I expected this one to be a lot harder to see, and indeed it was. Some field-scanning and patience was needed before I saw a faint elongated patch. *Burnham's* lists this object as magnitude 12.9, which is near the limit of a 5" telescope.

The tiny globular cluster **NGC 5286** was my next target, visible as a fairly easy-to-see small round patch. This distant faint globular cluster was a great contrast in appearance to the nearby mammoth Omega Cen. As I'd never seen any of these fainter Centaurus objects before, I got to tick them off on my map, something I haven't been able to do for a long time.

After looking at fainter fuzzies, I moved to **M83** in Hydra, high in the sky just north of the zenith (*see right*). I could see the galaxy through the finderscope, and at 40x I could see a big rounded patch with hints of spiral structure coming out of the nucleus. The rounded haze had localised brightenings that outlined radiating structures, giving the appearance of vague arms. There was a clearer bar moving across the nucleus, and it was an impressive view. I had only seen spiral structure a handful of times before, mostly on M33 and M51, but never on M83, a galaxy I had not seen many times.



Towards the west, Sirius was starting to get quite low in the sky now, and Canopus was following it. Nearby, the Large Magellanic Cloud shone down like a detached round patch of Milky Way. The Tarantula Nebula is always impressive to see, but was not on the list for that night.

I next moved the telescope more towards the north, and into Virgo. This constellation is well known for its many bright galaxies, and I wanted to try the Takahashi on them. M104 was my first target, and again was visible in the finderscope. I was getting very impressed with my new Bungendore back garden. **M104 (The Sombrero)** was seen as a distinct thin pencil line, with a noticeable, bright, almost star-like nucleus bisected by a dark line. The dust lane was very clear, and I could make out brightening to either side of it, making it look very similar to the famous photos. I think M104 would be breathtaking through a larger aperture.

Before leaving the vicinity of M104, I moved the telescope to the centre of the constellation Corvus, and the fairly bright round planetary nebula **NGC 4361**. It was clearly seen as a round uniform patch.

Saturn was quite high north of the zenith, and I had a look at 280x. A lot of my time is taken by looking at the Moon and planets, and the Takahashi certainly doesn't fail to impress. **Saturn** was a brilliant sight, with the Cassini division visible along the ring edges, and I also think I saw the elusive Crepe Ring. Certainly the sky was not as dark immediately inside the inner edge of the ring as it was immediately off the planetary disk, or even outside the outer ring edge. The ability of the Takahashi to resolve tiny intricate details on the planets is truly amazing. I could see four moons, and vague belt details, which looked a light shade of tan, compared with Saturn's general yellowish-brown colour. I have yet to see any sign of the large white storm that erupted on Saturn earlier in the year, if indeed it is still there to be seen.

The telescope was then scanned through the general region of the Virgo Cluster. I picked out **M87** and several others, covering an area a few degrees across. After a quick stop to see **M65** and **M66** in Leo, I then moved the telescope back towards the southern skies.

By now it was getting quite late and, as it was a workday the next day, I had to call it quits the right side of midnight. Before I wrapped up, I moved the telescope into Scorpius, which was now on its side rising in the East. The [Milky Way](#) through Puppis, Carina, Crux, Centaurus and down into Scorpius was very impressive, and I finished the night by splitting [Antares](#) and its tiny speck-like companion (easier than Sirius to split and see consistently). Amazing to think that this tiny star is actually a great deal brighter than our Sun, orbiting Antares, the massive red supergiant, a nice shade of orange in the telescope. [M4](#) was my last object, a bright globular cluster lying next door to Antares, and clear in the finderscope. An apparent chain of stars crosses its bright core.

My first dark-sky observing session from Bungendore was a great success, and I very much look forward to seeing the sights of the Milky Way in winter. Although it gets very cold in Bungendore in the winter, with regular hard frosts, the sights of Sagittarius and Scorpius when at the zenith are well worth venturing out for. As the Takahashi is very well suited also to splitting double stars, I look forward to using it to split some of the Southern Hemisphere's more famous stellar systems, as well as starting on the hundreds of objects that lie off the beaten track.



[New objects to observe](#)

[Michael Roe](#)

In over 40 years of telescope observing, I've observed almost everything that can be observed in the night sky, including the Moon, planets (except Pluto), comets, galaxies, stars, nebulae, even novae and one supernova in the M81 galaxy. So, what else is left?



Of course there are always great swathes of sky I've missed, even a few Messier objects and plenty of faint galaxies.

I've seen many meteors and satellites, too. But one type of artificial satellite is fiendishly difficult: the geostationary satellite, used for communication and satellite television broadcasting. At about 22,000 miles from the Earth's surface and perhaps 10 feet across, a geostationary-orbit satellite is very faint. There's a ring of such satellites over the Equator, some working, others now silent, and parts of rockets too. All have a declination of about $-7^{\circ} 45'$ as seen from our latitude, and have magnitudes in the range +11 to +14.

After some time searching in a freezing winter of terrible snow, I was searching for faint galaxies near the Bowl of the Plough with my Lightbridge 12" Dobsonian telescope. At 2.55 am on 6 January this year, near the star 43 Ursa Majoris, I spotted a faint orange satellite about magnitude 10–11 slowly moving south past the centre of my field of view at about $1\frac{1}{2}^{\circ}$ per minute. I believe it was a Russian [Molniya](#) TV satellite, which has a very elliptical polar orbit, going 25,000 miles above the North Pole.

Eventually I found a true geostationary satellite on 1 February at 7.45 pm, near 29 Orionis. Initially it was magnitude 10–11, then it flashed at magnitude 9.

Just a bit earlier I found a white dwarf, one of those tiny stars about as big as the Earth with hundreds of tons of mass compressed into a cubic inch. This white dwarf was part of the 40 Eridani triple star complex very close to a red dwarf – this is the easiest white dwarf to observe.

Next I wanted to see the brightest quasar. I found it – 3C 273 – in Virgo at magnitude +12.5 approximately (it varies). I even saw the magnitude +13.5 star next to it. This quasar is 2000 million light years away. A vivid orange star, SS Virginis, is a guide to its position.

While I was looking for this star and also trying to see a faint nearby galaxy, a possible geostationary satellite of about magnitude +12 went by, then flashed at mag +8 and disappeared. But this is almost on the celestial equator, and 4° too far north! Still, it proves there are many new objects to observe, some of them unexpected.

GENERAL ARTICLES

Two-dimensional or three-dimensional?

John Crowther

A number of us will have watched Professor Brian Cox's series of programmes on BBC2, *Wonders of the Universe*.



Apparently this young, pleasant and extremely knowledgeable man is popular with female viewers, so we hope that many ladies will progress into a serious interest in astronomy after seeing the programmes.

I learned from the third programme that matter (stars), space and perhaps time are swallowed up by black holes. So a black hole seems to be the reverse of a mini Big Bang.

We know that there is no such thing as a perfect analogy. Professor Cox used a dramatic one. He stood on the banks of the Zambesi above the Victoria Falls, 'the waters that thunder'. Gravity doesn't seem to be a weak force there, so as a wise scientist he didn't attempt to launch himself in a boat even some distance from the Falls.

But perhaps a different analogy should also have been used: one with two-dimensional Flatlanders unknowingly immersed in a three-dimensional world, or in a bath when the plug is pulled out. For isn't a black hole really a black sphere?

Also in the third programme, the professor was on the summit of a peak in a snow-covered mountain landscape. Using the landscape around him, he described spacetime as being warped by the gravity of stars, planets and satellites. The well-known stretched-rubber analogy of a 2-D sheet being warped by spherical metal balls was not used, but that and the rotating whirlpool in the river (which did appear in the programme) are surely better analogies.

We can also regard a hurricane weather system as a model of a galaxy, expect that at its centre lies the eye of the storm – very unlike a black hole. For the eye of the storm is a quiet area where the sun and the stars can be seen. However, it is a temporary peace, for soon the storm returns but with its winds roaring in from a direction 180° away from the original one.

FOR SALE OR ON FREE OFFER

Darren Bushnall (darren.bushnall@ntlworld.com) writes from Hartlepool to say:

I have an old 22cm f/6 Newtonian scope (just the OTA) itching for a good home. It's about 23 years old and needs a bit of TLC. It was a Dark Star Dobsonian with David Hind optics, so it produces good views. It's on free offer to anyone in CaDAS – it would make a nice little project to reconvert it into a Dob.

There was then an exchange between Jürgen and Darren on the CaDAS Facebook page:

[JS:] I definitely can help if any work is needed – e.g. optical cleaning, new focuser etc. – but I've never built a Dobsonian, so it would be better to give this job to a proper woodworm. ;)*

[DB:] Stick some tube rings on it and it could go onto a mount. The focuser is not bad but is a bit old-fashioned and the optics really need a damn good clean. The tube could do with a lick of paint, but apart from that it's pretty solid. I just don't use it anymore as I've got other scopes and this is just gathering dust, which is a shame.

So – please get in touch with Darren if you'd like to take this on or at least have a look at it. Buying Jürgen a few pints could help, too ...

Alternatively, Sue Barnes suggested that it could make a good CaDAS 'workshop' project for a group of people. The renovated scope should probably then go on CaDAS's formal inventory, but could readily be lent on short- or long-term loan to one or more members.



Keith Johnson (watcheroftheskies@talktalk.net) has news of another telescope, this time for sale:

I've had a phone call from a friend with whom I go back a long way. He's the reason I got started in astronomy after I had my first look through his telescope, at Saturn. That was way back in 1974! Sadly, he's selling that telescope as he never uses it. Details:

Fullerscopes 8.5" f/6 Newtonian reflector

OTA length 53", diameter 10"

Mk3 mount, including counter-balance weights and collars

Mk 1 spider; Mk 2 rack & pinion focuser

Eyepieces: 1.25" 25mm, 1.25" 6mm, Barlow lens

Classic black cast-iron pillar with the Fullerscopes name on the base of each of the three support legs, holding an equatorial mount.

Mirror was re-aluminised 4 years ago, and the optics are in very good condition.

This is a classic mount holding a very good instrument.

Offers around £200.

Keith adds a personal plea:

If any of you buy it ... would you mind if I look at Saturn once more through this truly beautiful instrument?

Go on, go on, go on ... you know you want to ...

THE TRANSIT QUIZ

Answers to April's quiz

I offered some Latin terms that are used frequently to identify types of structure on the lunar surface and asked you to say what they mean in that context. Here are the answers, using definitions from Peter Grego's Philip's Moon Observer's Guide.

- | | |
|--|------------------------------------|
| 1. Catena, as in <i>Catena Davy</i> . | Chain of craters. |
| 2. Dorsum, as in <i>Dorsa Cato</i> . | Wrinkle ridge. |
| 3. Lacus, as in <i>Lacus Somniorum</i> . | Small plain. |
| 4. Mare, as in <i>Mare Crisium</i> . | Large plain. |
| 5. Mons, as in <i>Montes Alpes</i> . | Mountain. |
| 6. Oceanus, as in <i>Oceanus Procellarum</i> . | Very large plain. |
| 7. Rima, as in <i>Rima Bradley</i> . | Rille (narrow valley). |
| 8. Rupes, as in <i>Rupes Cauchy</i> . | Scarp or escarpment |
| 9. Sinus, as in <i>Sinus Iridum</i> . | Indentation at the edge of a mare. |
| 10. Vallis, as in <i>Vallis Alpes</i> . | Large valley. |

May's quiz

Fill in each blank (whose length is not proportional to the length of the answer!).

- _____ has the shortest rotation period of any solar system planet.
- The ecliptic is inclined to the celestial equator by about _____.
- The plane of the Moon's orbit is tilted by about _____ from the plane of the Earth's orbit.
- Wien's law states that the dominant wavelength at which a blackbody (which a star more or less is) emits electromagnetic radiation is inversely proportional to its _____.
- _____ is an optical defect whereby light of different wavelengths is bent in different amounts by a lens.
- The atmosphere is transparent chiefly in two wavelength ranges known as the optical window and the _____ window.
- _____ large planetary satellites (one of which is the Moon) are comparable in size to the planet Mercury. For extra points, name them!
- Spacecraft measurements reveal that 96.5% of the Venusian atmosphere is _____.
- The orbital periods of the three innermost Galilean satellites of Jupiter are in the ratio 1 : _____ : _____.
- Most of Saturn's rings exist inside the planet's _____ limit, where disruptive tidal forces are stronger than the gravitational forces attracting the ring particles to each other.

