CYGNUS

Newsletter of the Norwich Astronomical Society

(registered Charity No. 2620968)

President: Mark Thompson FRAS

SOLAR DAY REPORT. SEE PAGE 20.

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COVER

The picture shows Francis preparing to view the Sun safely on our solar day.

DISCLAIMER

Cygnus is a quarterly publication produced by and for members of the Norwich Astronomical Society.

Opinions expressed in Cygnus are those of the contributors only and do not reflect those of the Society.

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EDITORIAL

I have to start with an apology to those who receive the paper version of Cygnus. The 'Sketchpad' section in the last issue featured a large 'X' where a drawing was supposed to be. As the drawing in question was one of my own I wasn't too worried about this inexplicable error, which I suppose was something to do with the printer's computer not liking the memory stick on which that edition of Cygnus had been submitted (I refuse to believe it didn't like my drawing!). I've tried again to reproduce the sketch in this issue—fingers crossed (and apologies to recipients of the electronic version of Cygnus who will be seeing this drawing for the second time!).

Actually the 'X' in the summer issue ties in very well with the subject of my 'Moonwatchers' piece in this Cygnus. Turn to page 4 if you are remotely interested. Or you may prefer to browse the Webb—the Webb in question being Paul Webb whose article is on page 16. Page 14 sees an article by a new contributor, Mark Casto; both Paul and Mark's articles were unsolicited and didn't involve the usual nagging, wheedling, threats and blackmail that I usually employ to get articles from members. Long may this state of affairs prevail!

Wishing you clear skies,

Graham

P.S. Note my new email address on page 2.

CHAIRMAN'S REPORT

Welcome to the latest issue of Cygnus. Hopefully you've all received membership renewal forms, completed them and sent them back! Thanks to everyone who has, and a prod in the ribs for those who haven't!

All those who supplied an email address with their membership application will have noticed that I am sending out newsletters with general NAS news. I plan to send these monthly as I am aware that emails sent too often become spam. For more up-to-the-minute information members should visit the website and the forum. If members have information to include in the monthly newsletter please contact me.

It was disappointing that Mark Thompson could not deliver his talk at the first public evenings owing to illness. Dave Balcombe stepped in and delivered lectures with only 24 hours notice — thanks Dave, it is greatly appreciated.

There are a couple of volunteer requests I need to repeat here. We have lost the services of Mark Shepherd until at least Christmas and are in need of volunteers to deliver some group visit lectures. These happen on weekday evenings from about 7 or 7.30pm. If anyone feels they could help please talk to any committee member as soon as possible.

Work has been done over the summer — the cladding on the cabin and the concrete slabs for two new store sheds are obvious. Much more general maintenance, which doesn't get noticed but is just as important, has also been done. Thanks to everyone who helped.

I will stress that the NAS is a fabulous organisation which relies on its members for its very existence. Volunteers from within our own ranks allow NAS to equip and run the site, indeed many visitors are surprised just how much we do ourselves. Some members supply labour , some administration skills, some bring funds into the Society via outreach events, but no matter what they do their contribution is significant and is recognised. Without that volunteer force work would not be done. We cannot afford to get contractors in and the site would decay, equipment would fail and inward investment would drop. It is **your** society and **your** site so please help to keep things running by volunteering if you can.

Andy G.

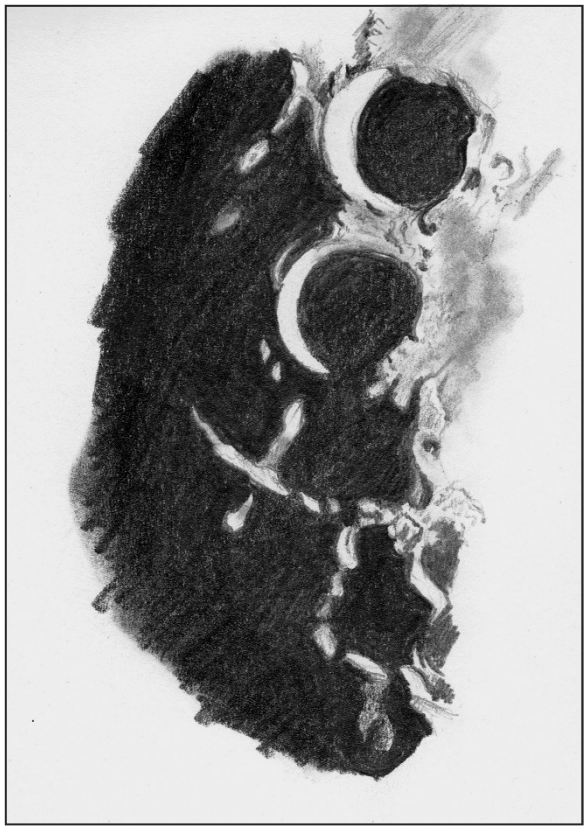
MOONWATCHERS

LUNAR ALPHABET CHALLENGE!

As a youngster I loved the book *Treasure Island* but always wondered why Ben Gunn, after all those years marooned on the island, should have a craving for cheese. The old fool was surrounded by goats, he ate goat and dressed in goat skins, so why had it never occurred to him to milk them?

At this point, dear reader, I suspect that you will be thinking, 'The old guy's finally flipped! What possible connection could Ben Gunn and goats have with the Moon? Well there is a connection, albeit a somewhat tenuous one. I got to thinking about those pirate treasure maps, where 'X' marked the spot where the booty was buried, because the subject of this article is the 'Lunar X', a transient effect that can only be seen for a few hours when the Moon is at First Quarter.

I'd read about the Lunar X and seen images of it, but had never seen it until earlier this year. This was not for want of trying, but either I missed the four hour window or, as so often happens, the sky was cloudy at the appropriate time. It seems I was not alone in this; many astronomers, both amateur and professional, have never seen the effect.



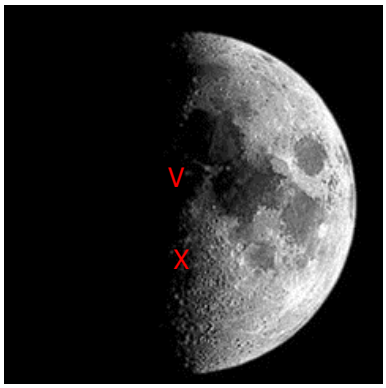
My drawing of the lunar X, made between 19.40 and 20.12 UT On March 8th.

My view of the Lunar X came when I wasn't looking for it. On the 8th of March this year I was experimenting with my Celestron 8SE coupled with a video camera to throw an image of the Moon onto my laptop. The idea was to make sketching more comfortable; drawing from a live view on the screen had to be easier than drawing at the eyepiece—if it worked for Dale Holt it could work for me! I'd already made one or two sketches this way and on that evening I had pencils and sketchpad ready and was looking for an interesting feature on the terminator. Well, I certainly found one! As I adjusted the focus the fuzzy image on the screen sharpened and I found myself staring at the Lunar X, dead centre of the screen.

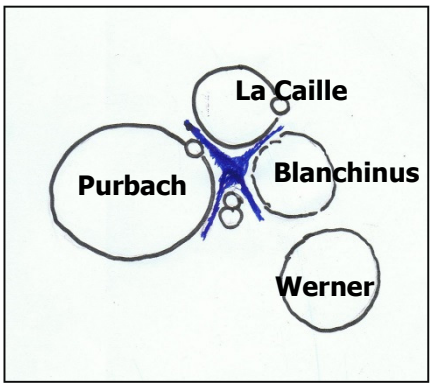
Having made my drawing I then went indoors and Googled lunar X, discovering that it is sometimes referred to as the Werner X, the 70km diameter Werner being the nearest crater that is fully lit, closest to the effect. The X appears when sunlight is striking rims and ridges between the craters La Caille, Blanchinus and Purbach (a diagram on page 5 attempts to show how the X is formed).

I also learned that a 'lunar V' is visible on the terminator at the same time as the X and had I shifted the field of view northwards towards the Mare Vaporum I would have seen that also.

I shall certainly be looking out for this effect each time the Moon is at first quarter and if any of you manage to image or sketch either the V or X effects I hope you will send them to me for inclusion in future editions of Cygnus.

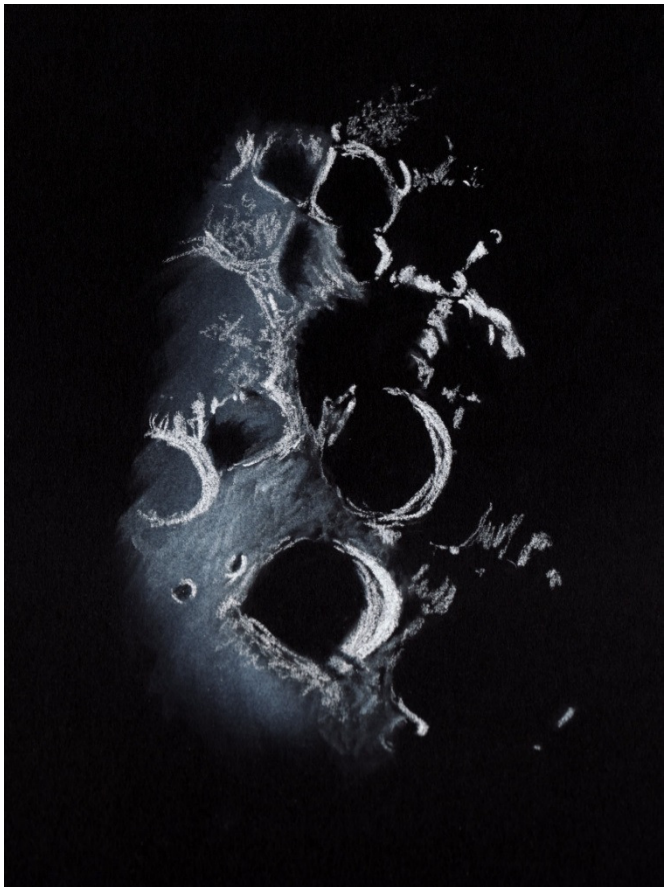


The approximate positions of the lunar X and V are shown above.



Where the lunar X is formed. North is to the top of the diagram.

It also occurs to me that it might be fun to issue a lunar alphabet challenge. We have an X and a V, but what other letters might NAS members be able to find among the Moon's maria and craters? OK, 'O' will be easy with so many craters to chose from, so you won't have me asking, 'Got any Os?' (Though I'd be interested to hear which craters you think best qualified to represent that letter.)



But what about 'S' and 'I'? I can think of two features that approximate to those letters — can you find them? Share any sketches, images and/or descriptions, including positions, of any 'letters' that you spot by sending them to me and we'll see how many we can manage to find between us!

Graham Sparrow

The drawing on the left was made by Sally Russell. Some members may remember Sally coming to Seething to do a sketching work-shop back in 2010. Sally's drawing was done on the same night I did mine; she used white pastel on black Cranford paper, whilst I used graphite pencils on cartridge.

I first became aware of Sally's drawing when it appeared as Lunar Picture of the Day. Sally kindly agreed to let me use it for Cygnus.

SUE'S STELLAR SUGGESTIONS

CYGNUS

On a clear night, from a dark site, there is little to compare with the constellation Cygnus. As it flies down towards the western horizon in autumn it is a beautiful sight, whether observed through a telescope, with binoculars or even simply with the unaided eye; plus our imagers produce some amazing pictures of the nebulae in this area.

Cygnus is aptly named for a swan, with the Milky Way glowing along its length. The star **Deneb**, marking the swan's tail, is one of the three making the Summer Triangle, and at the swan's head we find the beautiful double star **Albireo**. This is a great target for binoculars or a small telescope; it is also an impressive sight to show someone new to astronomy. The apparently single white star, when seen through even a modest scope becomes two stars, one blue and the other orange.

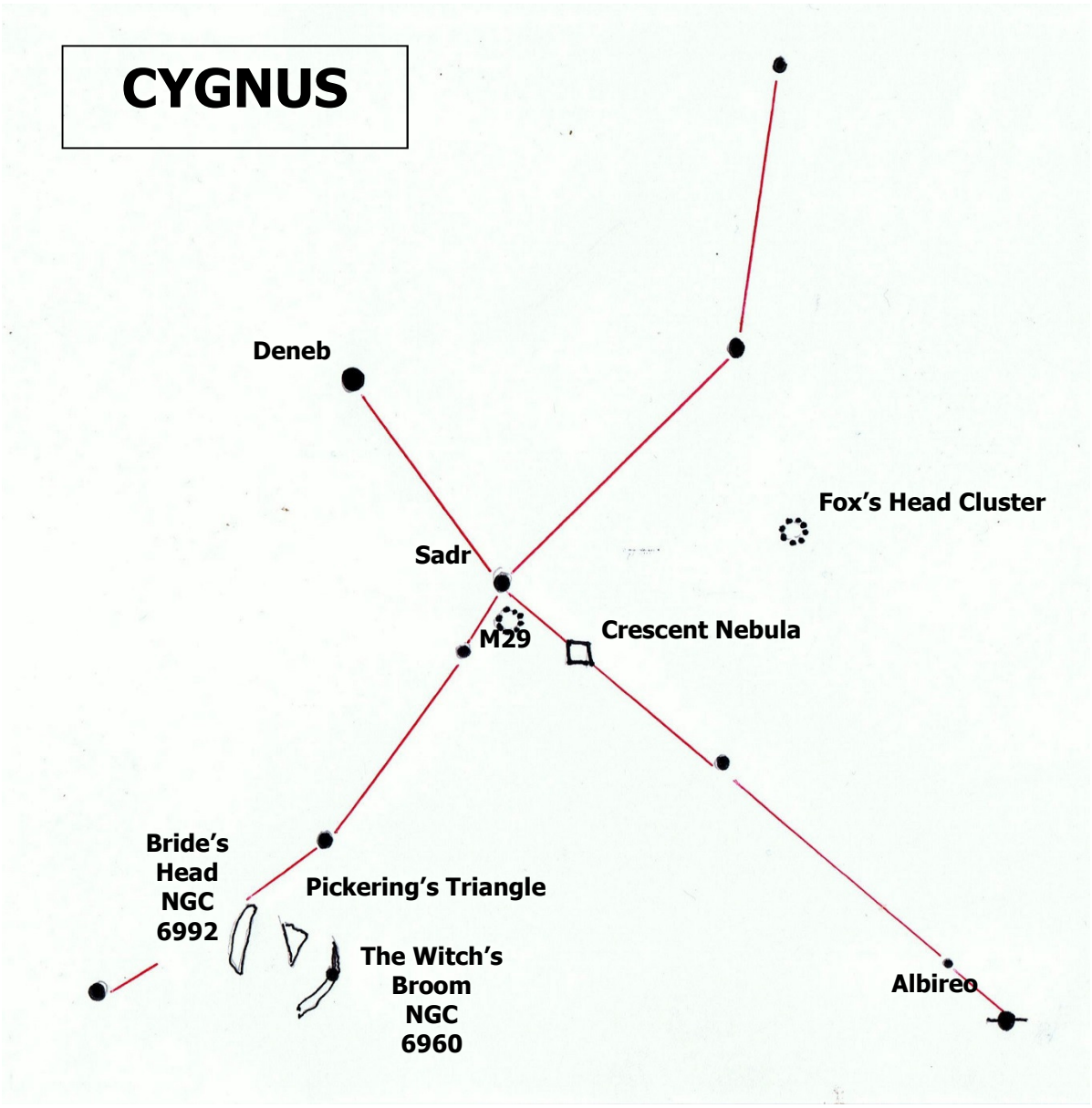
About a quarter of the way between Deneb and Albireo is **Sadr**. The swan's wings spread out either side from this star. If you look along the wing to the left of Sadr you will see three stars in a crooked line. Go below the space between the first two of these stars and you will see another star, making a neat triangle. This is the star you use to find the **Veil Nebula**.

One huge surprise for me was to see the Veil Nebula for the first time visually. I had imagined that it was a purely imaging target until one memorable night at Kelling when I had my first view through a large dobsonian scope of the **Witch's Broom (NGC 6960)** part of this very large supernova remnant. When I had stopped jumping up and down with excitement Dave Provan, whose telescope it was, then lent me his ultra high contrast filter and suggested I find it in my 85mm refractor. It was surprisingly easy to find using the star I mentioned. From then on this has been one of my favourite objects. Using an alt-azimuth mount it is then quite simple to move the scope around to view the **Bride's Head (NGC 6992)** which is up and to the left, and then to follow round to find **Pickering's Triangle** which lies between these two elements.

Another elusive nebula which I have seen in my 85mm refractor, on a very clear, transparent night … and with some expert help … is the **Crescent Nebula (NGC 6888)**. This lies about a quarter of the way from Sadr to Albireo. Again this is more familiar as an imaging object, or to view with a very large telescope, but there is a great satisfaction in finding these faint ethereal beauties in a smaller scope.

There are many clusters within Cygnus, one of my favourites is the **Fox's Head (NGC 6891)**, below the stars making the right hand wing. Here again a good dark site and clear sky are needed to make out the pointed ears and muzzle. There is also the **Cooling Tower (M 29)**, just off to the left of Sadr.

As the Milky Way runs the length of the constellation it is also a great pleasure to settle comfortably in a sun lounger and simply sweep the length with binoculars. So here we have a constellation with something for everyone, from those new to astronomy, looking at a beautiful double star, through those wanting a comfortable sweep with binoculars, those seeking a challenge with a small scope, finding elusive nebulae, to those taking stunning images. I hope you enjoy observing the swan in the sky.



Sue Napper

STARS AND THEIR Xs:

The Plough is the best-known pattern of stars in the sky. From the UK you can see it at any hour of any clear night of the year, as it never sets, but it's on autumn evenings like these, at its lowest in the northern sky, that the Plough is most familiar and striking. Exceptional among the chance alignments of widely strewn stars we see as patterns and constellations, the majority of the Plough stars are true neighbours, and not only neighbours, but family, born together, still moving together around the Galaxy as a loose cluster but in the process of going their separate ways.
Though our star patterns seem fixed, unchanged since ancient times, the stars are actually moving in the sky slowly but steadily, and over tens of thousands of years the patterns will change considerably. The motions of the Plough's seven stars, projected over the next 50000 years in Figure 1, reveal the five inner stars (plus Mizar's naked-eye companion, Alcor) are moving in more or less the same direction at the same rate and will hold their configuration, while the outermost stars Alkaid and Dubhe are moving in almost the opposite direction, and will distort the familiar pattern.

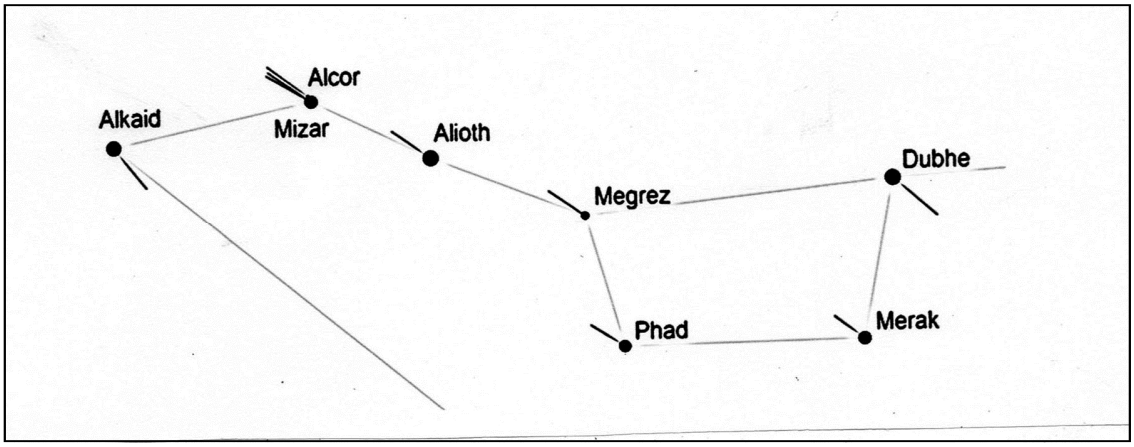


Figure 1: The stars of the Plough with lines showing their movement (proper motion) over the next 50000 years (created using Patrick Chevalley's Cartes du Ciel 3.4.1).

This steady progress of a star across the sky in a particular direction, its ***proper motion***, occurs because each star, moving in its own orbit around the Galaxy, is moving in a slightly different way to the Sun. Where, like the inner stars of the Plough, a number of stars in a particular patch of sky have the same proper motion, these stars have probably been orbiting together as a group since their formation.

It is the vast distances of the stars that makes proper motion appear so slow. The inner Plough stars cross just 0.1 arc seconds of the sky - the apparent size of a 200-metre crater on the Moon - per year, even though they are moving at 10-20 km per second relative to the Sun. While some stars with larger proper motions, such as Arcturus, are travelling at much higher relative speeds, most are simply closer. Indeed, surveying the sky for stars with exceptionally high proper motions is a very effective way of discovering the closest stars to the Sun.

Measuring accurate distances to individual stars, however, requires a much more detailed observation of the star's movement over a period of years, as shown in Figure 2, where we see that stars don't simply move in dutiful straight lines but appear to waltz across the

heavens in a series of sweeping joyful loops. These loops, repeated every year, have nothing to do with the star's real motion through space, but are caused by viewing the star from slightly different angles as the Earth orbits the Sun. The closer the star, the larger the loop it appears to perform with respect to the much more distant stars or galaxies that barely move at all. If there were no proper motion, the loop would be a closed ellipse whose longest radius in arcseconds, the star's ***parallax***, is the reciprocal of its distance in parsecs. The similarity in size and form of the loops performed by the inner Plough stars and Alcor, shown in Figure 2, tell us these stars are at similar distances of around 25 parsecs, while the outsiders Dubhe and Alkaid perform somewhat smaller loops and are a little further away.

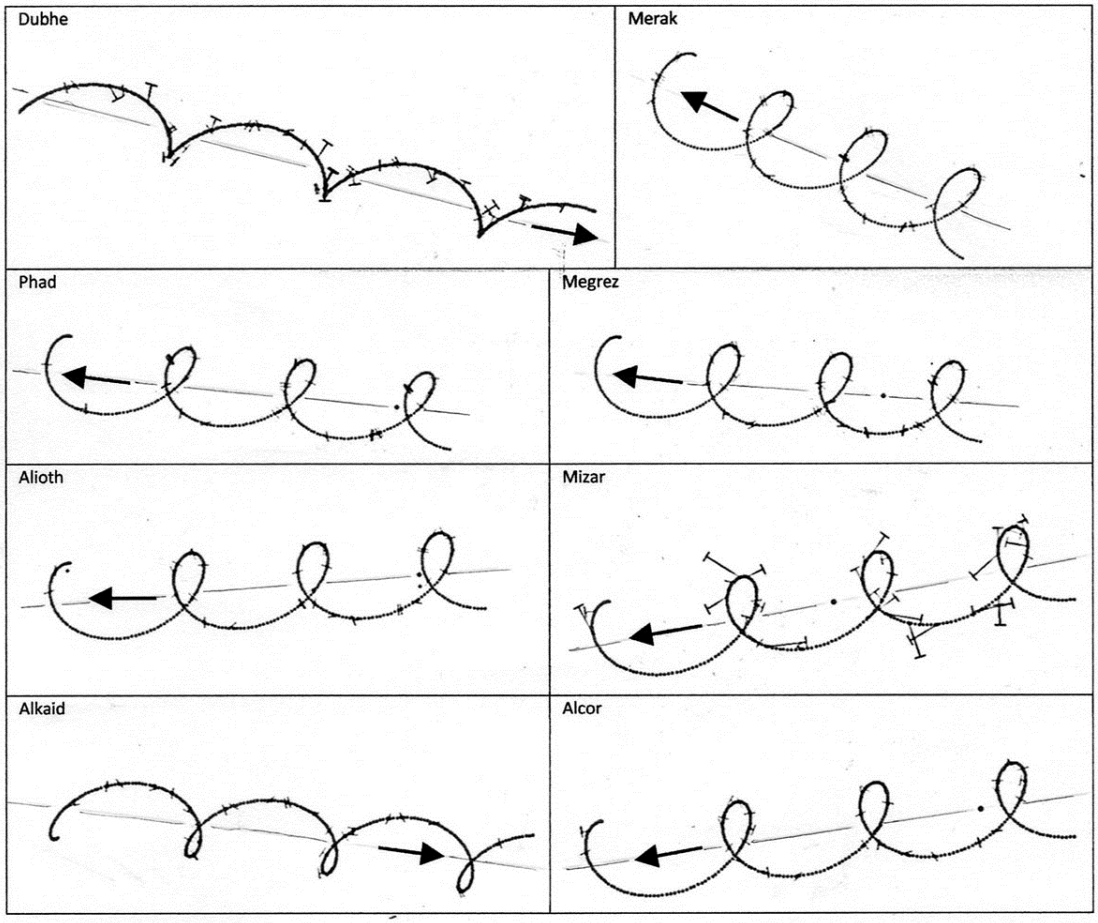


Figure 2: Parallax and proper motions of stars in the Plough over the 3.5 years of the Hipparcos mission.

The inner Plough stars thus form the closest star cluster to the Sun, the Ursa Major Cluster, named after the constellation that includes the Plough, but it is rather a loose cluster: the separation of these neighbours is 2-3 parsecs, greater than the distance between the Sun and its nearest star system, Alpha Centauri. While the divergence in the directions of the

inner Plough stars in Figure 2 is largely due to the coordinate system, there are divergent motions that will cause the stars to drift apart with time. This process is accelerated by gravitational interactions as the cluster orbits through the Galaxy. Indeed, stars with the same motion as the inner Plough stars, such as Alpha Coronae Borealis, are found scattered over the sky, and likely many of these were part of a formerly much larger and more glorious Ursa Major Cluster that is in the process of breaking up. That is the fate of most star clusters.

In x-rays the Plough is far from glorious; it almost disappears! The inner Plough stars are all white Vega-like stars, hotter, larger, more luminous than the Sun, around a tenth its age and 1.6 -3 times its mass, that have no known mechanism for producing x-ray emission. Dubhe, a slowly rotating evolved giant, and Alkaid, a more massive and luminous blue star similar to Spica B, are also expected to be weak x-ray emitters at best . Yet, Alcor, Mizar and Phad have all been detected to emit x-rays at levels from 1 – 6 times the Sun's peak. Alcor was only recently discovered to have a low-mass companion similar to those of Castor A and B, which is almost certainly responsible for its x-ray emission. Given the difficulty of finding such faint companions close to bright hot stars, I wouldn't be surprised if a similar yet-to-be-discovered is the source of Phad's x-ray emission.

Mizar, whose wide partnership with Alcor is the most famous naked-eye double star in the sky, is the most interesting case of the three, because Mizar itself is an historically important quadruple star and because a serendipitous, unpublished x-ray observation of Mizar may help us to resolve the identity of its fourth component.

Mizar was the first double star discovered at the telescope, and remains a rewarding, easily-found, bright, well separated pair for anyone with a small telescope. Both components are white, Vega-like stars, which don't emit x-rays. The brighter, Mizar A, was the first star discovered to be a spectroscopic binary, the absorption lines of both components being visible in the spectrum, and merging and separating and merging due to the rhythmic Doppler shifting as the two stars orbit each other every 20.6 days. The two components of Mizar A are near-identical Vega-like twins, which don't emit x-rays.

Mizar B has also been identified as a spectroscopic binary, with a period of 6 months, but only the Doppler shifting of one star's absorption lines is observed. The companion is not bright enough to be observed in the spectrum and yet it is often described as a near-twin of the visible Mizar B. This puzzling conclusion arises from assuming that the centre of mass of the Mizar quadruple system is moving toward us at the mean radial velocity of the Ursa Major cluster, then the measured radial velocities of the Mizar A and Mizar B systems relative to this mean are due to their orbital motion about this centre of mass, and the ratio of the relative radial velocities of A and B is the inverse ratio of their masses. This method finds that the total mass of the Mizar B system must be about 80% that of the Mizar A system, which is only possible if the unseen component of Mizar B is of similar mass to the visible component, in other words another Vega-like star that does not emit x -rays or possibly an Altair-like star, the most massive star that does. The assumptions and uncertainties are big, however.

The new x-ray data for Mizar shows that the Mizar B system is clearly the source of the x-ray emission, at a level similar to the Sun's peak x-ray emission, and that this emission is consistent with the higher temperature corona of a low-mass star like the companions of Castor A and B, but not the lower temperature corona of the highest-mass coronal stars like Altair. In other words there must be a low-mass star in the Mizar B system, either instead of the proposed near-equal mass component, or in addition to it, which would make Mizar B a triple system, Mizar a quintuple and the Mizar – Alcor system a septuple, almost a cluster within a cluster!

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"*The spectroscopic orbit of zeta1 Ursae Majoris (Mizar B)*", Gutmann, F., 1965, Publications of the Dominion Astrophysical Observatory Victoria, 12, 361

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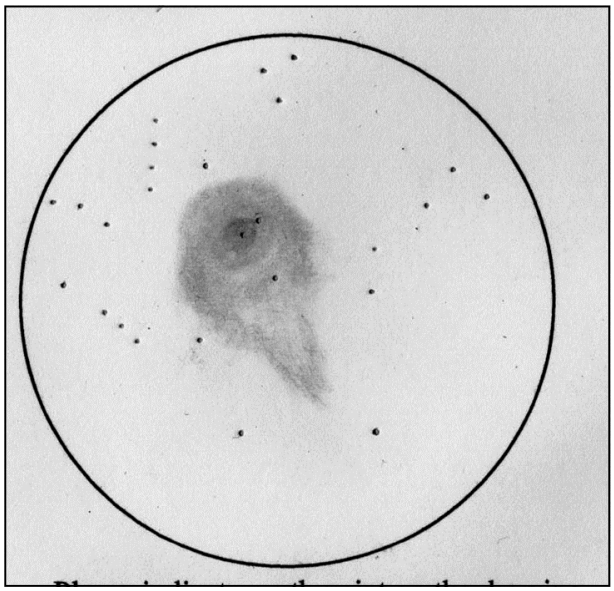
Kevin Briggs

NEW MEMBERS

Norwich Astronomical Society extends a warm welcome to the following new recruits:

David Chilver and Clare Goodman
James Adcock and family
Madeleine McArthur
Jack Walpole
Don Marchland and family

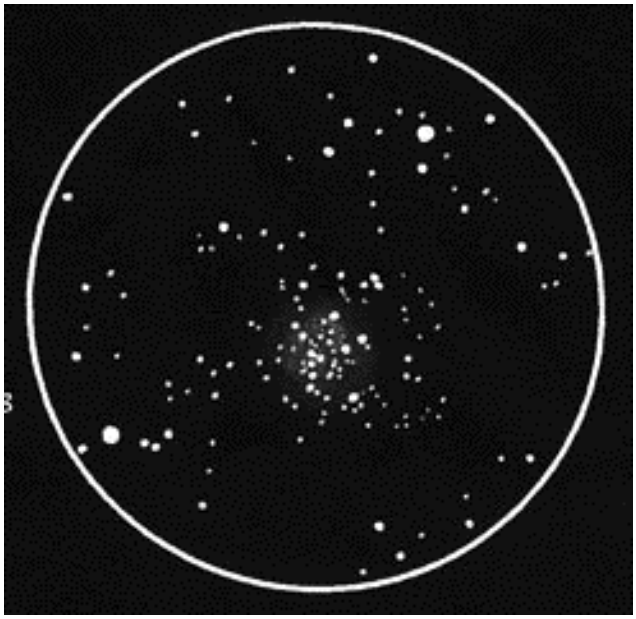
SKETCHPAD

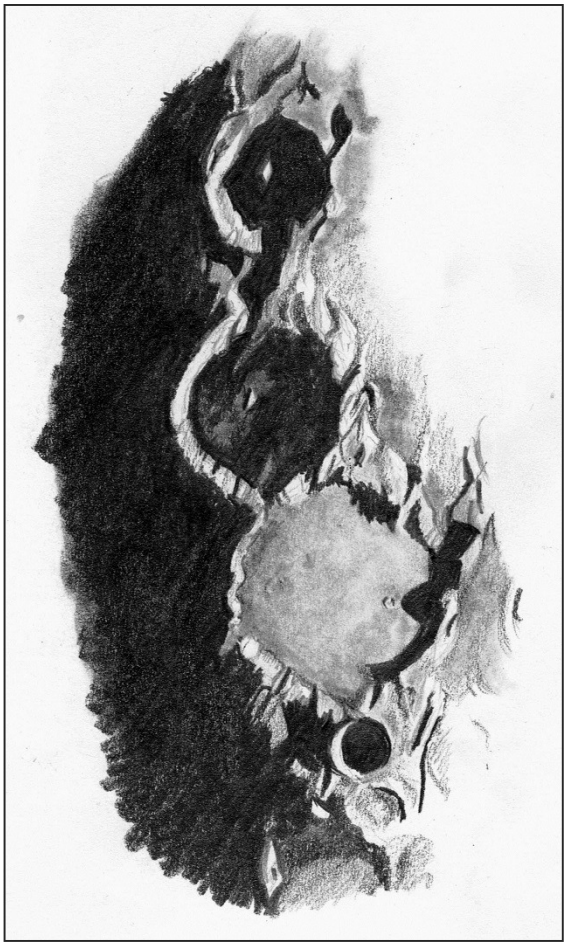


Above, left:
Andrew Robertson's drawing of Comet Jacques as seen through his 12" Mewlon using a 40mm Pentax eyepiece.

Above right:
The editor's sketch of the same comet, made with a more modest instrument—an 80mm achromatic using a 9mm plossl.

Below:
Dale Holt's sketch of NGC 6426.





With fingers firmly crossed that it works this time, here is the editor's drawing of the craters Arzachel, Alphonsus, Ptolemaeus and Herschel.

Astrophotography Processing Course a Success!

As we seemed to be attracting a growing number of keen astrophotographers to the club the running of a five week course on how to process your astrophotography images using Photoshop seemed a good idea, so I took up the challenge and decided to run the course. It was a great success and I'm happy to report it was well attended throughout the five Friday night sessions. In fact it was a real pleasure to share my processing knowledge with others and to learn from them along the way.

To ease people into the driving seat we began the course with a basic introduction to the dark art of processing and then moved on to more and more advanced methods through the ensuing weeks. What was clear to me from the beginning was the need to have good reference material to work from, so all five lessons came with video tutorials enabling those attending to take them home and practise the methods at their own pace. This proved a good idea as for some it was not possible to attend all the lessons and having them on video made it easy for people to catch up.

There are a lot of useful tutorials online for learning how to process your images, but they tend to be scattered all over the place and running a five week course enabled us all to follow the methods through from start to finish. The feedback I have received from those that attended the course has been very positive and encouraging, but what was most satisfying was seeing others make use of the course and develop their own styles and methods further. Processing of astrophotos is a very personal thing and we all have our own methods and tricks to make it work for us.

Those that attended the courses right to the end were set a final challenge which was to take one of my images and process the original file using all the methods they had learned throughout the course. After several images had been put forward I had to decide who was the overall winner and the prize was to have their image published in Cygnus and to be given exclusive use of my coveted notebook containing all my tips, tricks and secrets for processing astrophotography, gathered over a five year period.

So who was the winner? Well, in first place was Paul Fearn, who processed my challenge image using all the methods taught and who I felt had done a really great job on all the techniques to be used. These included star selection and reduction, colour correction and balance, along with gradient removal and many other methods.

In second place were Nico and Carly who did a fantastic job on the challenge and who, throughout the course, were an inspiration with their enthusiasm and many questions.

And of course in third place we could not have done a course on astrophotography without my dear friend Tom Latham, who worked very hard on all the challenges set and came up with some great work on his own images and that set as the final challenge.

So, a big thank you for all who attended the course. I hope it was valuable to you all and that you will go on to produce some stunning images for us all this coming winter. I really enjoyed running the course and hope we can repeat it for others next year.

Wishing you all clear skies,

Mark Casto

On the left is the image of Thor's Helmet that was set as the final challenge.

The image below is that produced by Paul Fearn in response to the challenge.

The editor is aware that images such as these do not reproduce very satisfactorily in the black & white paper version of Cygnus, but hopes this will not discourage Mark's talented pupils from submitting their images for future issues.

Members who receive the e-version of Cygnus will find both of these images again in the bonus pages.

WEBB PAGES

Observing notes from Paul Webb.

It is truly amazing to be able to observe from a dark sky location like Seething and a host of other locations in East Anglia. A bit of careful planning and you will be surprised at what you can see even with 6 to 8" telescopes from dark sky sites.

I arrived at a great dark sky site in Suffolk ,which has a completely clear southern horizon, just after 11pm on 30th June. My mission was to observe as many Messier objects I could low over the southern horizon. As I was not familiar with the constellations of Scorpius and Sagittarius it took me a while to get my bearings. Once I had them I noticed a tree and a bush obscuring the sky to about 10 degrees above the horizon. I would have to reposition myself several times to clear these minor obstacles. As it was not yet dark enough I had a look at a few familiar objects: M57, M13, M51 and M101. This last was extremely vague. More stars were coming into view along with a hint of the Milky Way. I turned my 12" dob to Cygnus and could just spot a hint of the Veil around star 52. As I was against the clock I decided to press on with my fairly ambitious plan of observing 23 Messier objects!

I started on M11, which is really superb, and then nearby M26. I then moved on to M4 and M80, two globs, which were fairly easy to find near to Antares in Scorpius. I had seen all these before and the view was quite nice considering they were fairly low. The next target, M19, would prove a little more tricky to find. I eventually found Theta Ophiuchi to start on and, moving down and right, followed some fainter stars to this small glob which was just visible in the finder and which I viewed with a 24mm panoptic at 49x. The sky was not so good here as I was now only 10 degrees or so above the horizon, but even lower I found M62, another glob but more of a blob than a globe of stars. Bad planning meant that I had to return to Theta Oph, hopping from there to three more globs, M9 and nearby NGC 6356 and 6342, these last two being very small and faint. From Theta Oph again and hopping down a fairly good chain of stars I found M6, the Butterfly Cluster. This was very nice and did resemble the creature after which it is named. Further down I found M7, confirming it the following morning from photos. This was very low, only two degrees above the horizon.

I repositioned the scope for the next targets in Sagittarius. The triangular teapot lid was quite clear to see so I started at star Kaus Borealis at the top point of the triangle and star-hopped to the right. M8, the Lagoon Nebula, was easily seen in the finder. This was a very nice sight at 49x, nebulosity quite bright and embedded in it an obvious open cluster. M20, another nebula close by, was not so impressive (maybe a filter would have helped?). Nearby was M21, a sparse cluster. Next I was moving up in the finder to M24, described on the map as 'star cloud', it was huge, filling the finderscope with what seemed like thousands of stars. This was one magnificent sight and a highlight of the session.

Next was M23, which was a little tricky to find, and then M18 and M25—all open clusters. Just above M18 in the finder was a very bright patch which turned out to be M17, the Swan Nebula. This was another highlight ; beautiful in the 11mm Nagler at 108x. I was about halfway through my list and oblivious of time as usual, but I needed to press on. I would have liked to have lingered on M17 but this was a Messier bagging session and I could always have a more leisurely session some other time. Moving up from here again obvious in the finder was the Eagle Nebula, M16. Clearly a cluster with nebulosity but not as stunning as M17.

Another repositioning of the scope. Fortunately this dob is not so heavy to lift and waddle the 20 feet or so to avoid the tree. Starting at Kaus Borealis again I found glob M28 near-by and then the large glob M22.This was quite irregular and deserves closer study at some future date. All the remaining targets were globulars and only a few degrees above the horizon. M69, M70 and M54 are all at the base of the teapot and, smaller and fainter than some of the others I had seen that night, they appeared as little fuzzy blobs. Sadly M55 was too tricky to hop to as the stars were quite faint and I think the tree was just in the way once more. So the final target of the night was M75, another glob, which I found by sweeping rather than hopping.

Finishing around 1.30am, it had been a very rewarding night. Packing up I cast my eyes up for one last look at the band of the Milky Way overwhelming the familiar constellations that sit within it. This session brings my Messier count to 100.

Paul Webb

Good to have you back Paul. Sounds as if that tree was a problem— have you thought of adding a chainsaw to your astro kit? - Ed.

CROSSWORD & CODEWORD ANSWERS

CROSSWORD

Across: 1. SUN 3. PLAIN 6. LEO 8. EVA 9. BOW 10.PHI 11. ION TAIL 13. AGN 14. SR 16. M101 18.BETA 21. PSI 22.PALOMAR 26. INT 27. SAS 28. ASTRONOMY

Down: 2. NEW 3. PALLAS 4. ARIEL 5. NEAR 6. LAPLACE 7. ORION 11. ISM 12. IRAS 15. AU 17. ORIONIS 19.IRAS 20. ALBEDO 21. PALUS 22. POINT 23. MAURO 24. IOTA 25. RAY

CODEWORD

1	2	3	4	5	6	7	8	9	10	11	12	13
I	**U**	**F**	**W**	**M**	**A**	**Y**	**O**	**R**	**J**	**V**	**L**	**D**
14	15	16	17	18	19	20	21	22	23	24	25	26
T	**C**	**Q**	**Z**	**H**	**X**	**E**	**K**	**B**	**S**	**N**	**P**	**G**

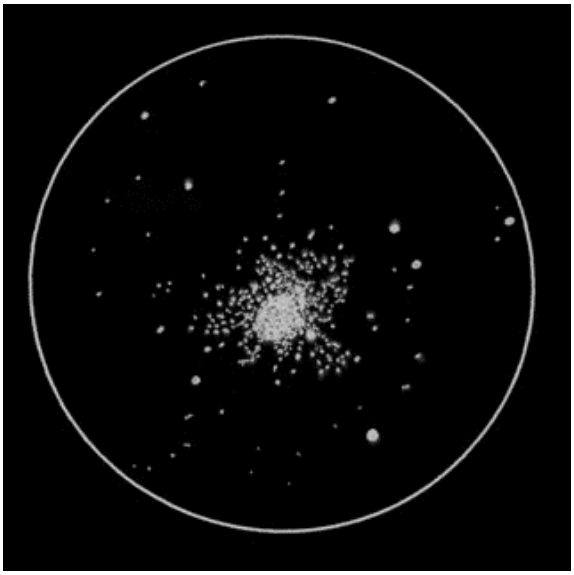
The editor apologises for the error with the numbering of the last letter of the word 'blackeye'(his mistake), though as Caroline had herself made a couple of spelling mistakes he doesn't feel too bad about this.

DALE'S DSOs

From a visual observer's perspective this just has be one of the most exciting times of year, the evenings are drawing in giving us more time to embrace our interest, yet the nights are still reasonably warm, so we can feast now in relative unhurried comfort upon deep sky delights which have been unavailable during sociable hours for a few months.

The winter giant Orion now rises from his summer slumbers in the east, an infallible harbinger of the winter that will surely come, while Hercules, the strong man, heads towards his resting place in the west, reminding us of the summer we have had. For these Deep Sky notes we are going to focus our attention upon Aquarius, the 'Water Carrier' a relatively obscure constellation, shaped somewhat like a Tadpole with a large head located below the square of Pegasus and above the bright star Fomalhaut , Alpha Piscis Austrinus, and with a snaking tail that extends above Capricornus and below diminutive Equuleus.

Aquarius is home to three of Charles Messier's famous catalogued objects, M2, M72 & M73.

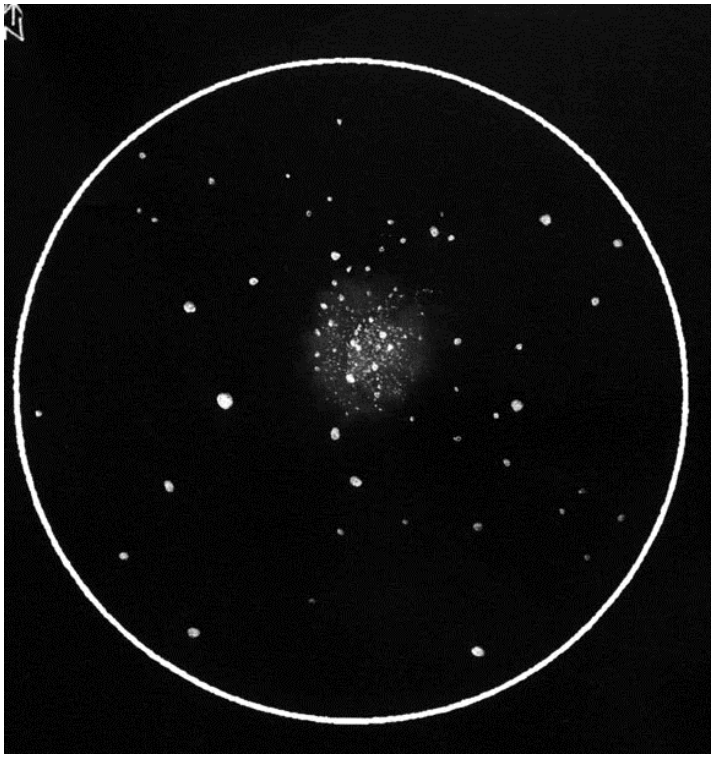


Dale's drawing of M2.

M2 is a bright showpiece globular cluster, located roughly midway between β (beta) Aquarii and α (alpha) Equulei. At mag 6.5 it is readily visible in binoculars, small scopes show its obvious globular nature and begin to hint at its spangled beauty, whilst using moderate to large scopes and pushing the magnification up to around 200x will reveal stellar granulation and a totally captivating object.

M72 is a far more subtle globular cluster; in fact it is the faintest of its kind in the whole of the Messier catalogue.

It is faint because it is distant at 55,000 light years, resulting in a gentle glow of mag 9.3. It can be picked out in large astronomical binoculars with careful observation but realistically it is a small scope object at best, with a 4" scope it will be showing a bright hazy patch but offering little resolution. Large scopes and short focal length eyepieces break through its mystery to reveal its multitudinous stellar identity. M72 can be found a little over 3° southeast of mag 3.8 ε (epsilion) Aquarii.



Dale's drawing of M72.

The third of the Aquarian Messier objects is little more than an asterism, a small knot of stars that the observer will wish to find and to tick on their observation list, but expect little more. M73 is made up of four stars that range from just over mag 10 to just under mag 12 arranged in a dart or Y shape. I suggest you enjoy the challenge of locating it, viewing it, ticking it off and then move onto more exciting observations.

Next on to our agenda is an exciting and unusual planetary nebula, NGC 7009, better known as the 'Saturn' Nebula, and yes it does have a reasonable visual resemblance to the most popular of all the solar system planets.

The visual similarity arises because the bright central disc, which is made of dust and gas resulting from a dying star's swansong destructive explosion, has two extensions or anase; these give the impression of projecting rings. The Saturn Nebula, named by Lord Rosse, the great Irish observer at Birr Castle in 1850, will fit into the same low power 1° field of view with M73. So find one and get the other free!

Next we push onto an object that may well be better known than all the other deep sky objects in Aquarius, yet despite it being well known I have always found it a bit of a challenge to locate. However once you have it in your field of view it leaps out at you, it is a real wow object, and completely fabulous to behold.

We are of course talking about the 'Helix' Nebula, NGC 7293, Caldwell 63. From my perspective this is just about the most magical of all autumnal deep sky objects, year after year I seek it out at the Kelling Heath Autumn Equinox star party where the big skies and clear horizons allow me to track it down low in the South.

I use the bright star Fomlhaut as a marker to help me find it, drawing a line to d (delta) Aquarii. At the midpoint I pan with a low power, wide field eyepiece equal distance to the right. There close to u (upsilon) Aquarii you will find this huge, 16' x 12', ghostly and hazy wagon wheel just hanging alone. The Helix is an extremely close planetary nebula at just 300 light years, which has no equal. Reputedly it

is visible in binoculars under dark transparent skies, though I have never managed to observe it that way yet. A small wide field scope is ideal for observing it, especially if using the favoured OIII nebula filter. Personally I find a UHC filter works very well too. The secret with using larger telescopes, which can tend to 'overlook' it, is to use the lowest power eyepiece possible.

For those who have found the beauty of double stars, there are plenty in Aquarius, my recommendation is 94 Aquarii, the primary is mag 5.3 the secondary mag 7.3 with a separation of 12.7", so it is easily split in today's high quality 80mm telescopes at 100x. The colours are subtle and attractive; Admiral Smyth described them as 'Pale Rose and Emerald' though you will likely recognise them more as orange and pale green.

For the larger scope owner, Aquarius has quite a few challenging galaxies, the NGC 6962 group close to mag 4.4 star τ (tau) Aquarii should give an interesting time to owners of 16" plus telescopes, as it will show as five faint smudges in the same moderate field of view. NGC 6962, at just under mag 12, is the brightest, largest of the group and is located centrally, so if you can locate and centre on NGC 6962 you can then take your time to slowly scan the field in search of NGC 6959, 6961, 6964, & 6967, which range from around mag 12.9 to mag 13.9.

Pax stellarum

Dale Holt

MEMBERSHIP NEWS

Renewals for 1st September2014 to 31st August 2015

Firstly, **many thanks to all the members who have already renewed for this year!** A great response so far, with many members opting to pay by standing order, which should help to smooth the renewal process out a bit in the future.

It would be very helpful if outstanding renewals could please be sent **before mid October** when reminders will be issued via email or post.

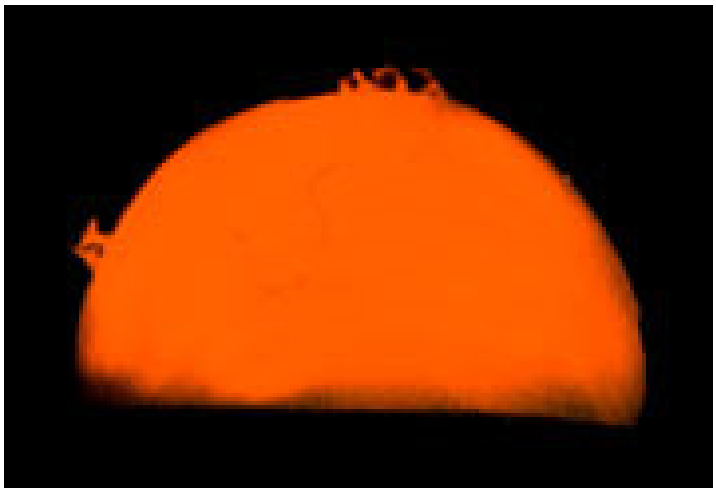
New membership cards (valid until 31st August 2015) will be sent to all renewed members together with the **2015 Astro Calendars—**this will probably happen during October. Your current cards are valid until 31st December 2014.

If you have opted to pay by **standing order**, please note that the NAS does not keep any records of your account details and cannot alter or cancel these payments for you (unlike Direct Debit). If you decide to cancel the standing order at any time please let me know!

Happy new membership year!

Tracy (NAS membership secretary)

NAS SOLAR DAY



Ploughing through my emails one day I picked up a message from Pam Shivak - an American associated with the Charlie Bates Astronomy Project. This was set up by Steven Ramsden to honour the memory and generosity of his colleagues and friends Charlie and Sue Bates, after their untimely deaths. Deciding to give something back to the community, Steven chose solar outreach and the wonders of our local star.

The CBAP now has many members across the world and raises a lot of money through donation and sponsorship, allowing it to take outreach directly into communities with organised events and pavement astronomy taking place all over the world. Pam was asking whether we wanted to be part of an international outreach event they were thinking about - 'International Sun Day'. I suggested this to the NAS committee and after a short discussion they took this on. NAS had not had a solar event for some time so our 'Sun Day' was entered in the diary for both members and the public.

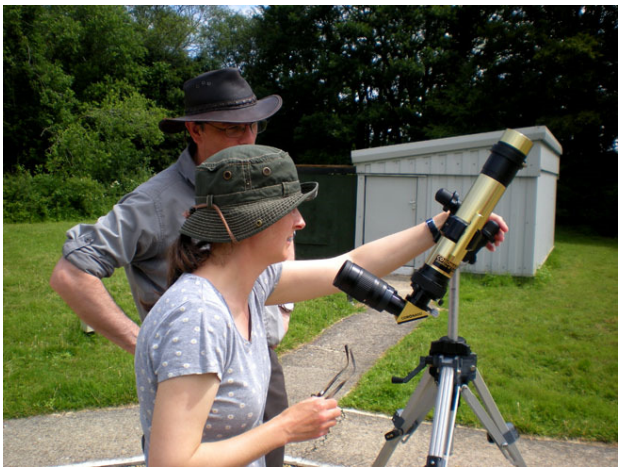
Despite the threatening weather forecast, the day was good, with reasonable skies and not too much annoying high cloud. Members had brought along a good range of Coronado, Lunt and Baader equipment, specifically designed to allow safe observation of the Sun. These allowed viewing of the Sun in two ways; 'normal' white light - which shows the entire spectrum but details are lost in the general glare - and 'Hydrogen Alpha (H-α)' - a specific wavelength of red light emitted by hot hydrogen gas in the corona, which allows the observer to see some surface detail and off-surface activity such as prominences.

People looked through several scopes to compare and contrast views. The day was quiet with little footfall but it was a success as a social observing event for members

and, because it lasted several hours, we were able to observe and discuss longer-term changes in the Sun's surface detail. It was a great day, with great company and it was especially nice to be able to **see** a group of people observing for a change, rather than relying on voices and silhouettes for identification!

All in all, an event worth doing again.

Andy G.



Solar sketches on this page are by Sue Napper. Photographs, taken at the event, show members with their scopes. That to the right shows Barry Dingle, inventor of a cunning device to locate the Sun. Turn the page and learn how to make one for yourself!

MAKE YOUR OWN 'DINGLESCOPE'

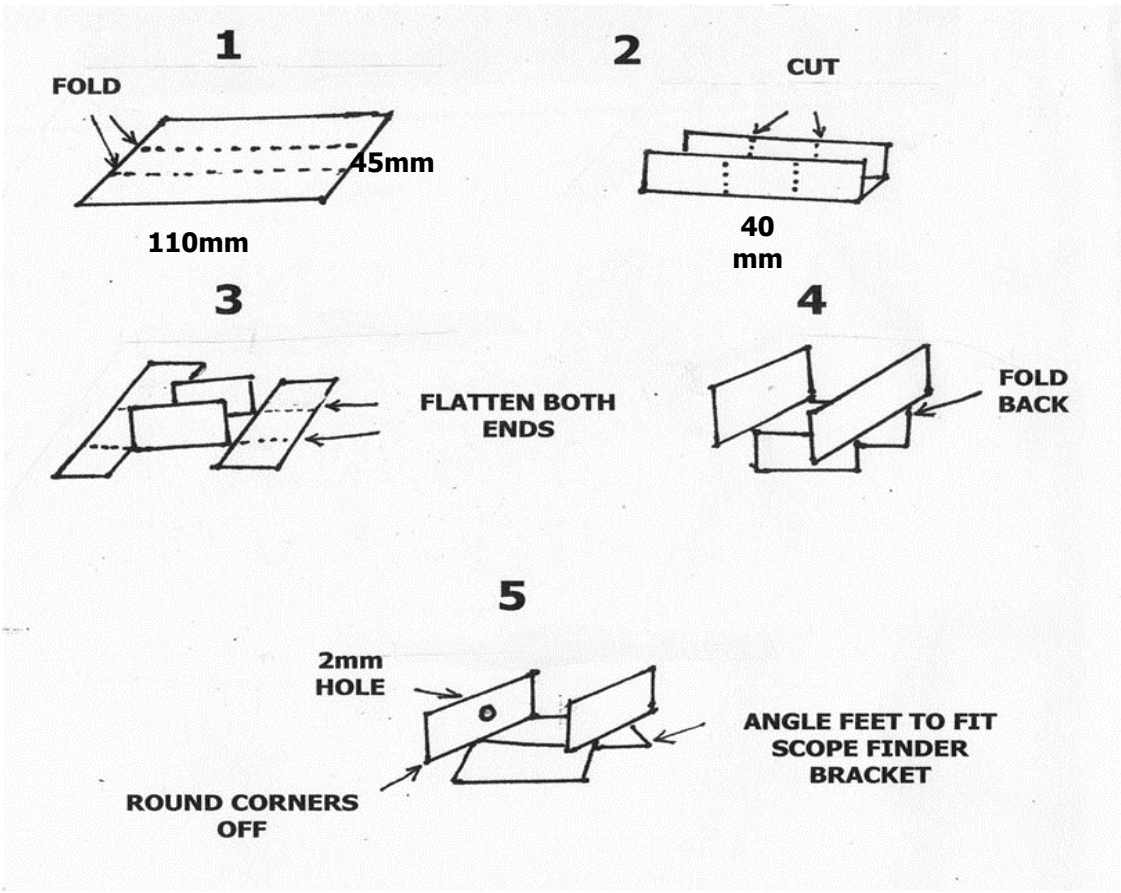
It's easy enough to see the Sun (though staring at it, even with the naked eye, is of course a definite no-no) but locating the Sun when trying to observe with a telescope fitted with a white light filter can be tricky, as one obviously can't look through the finder scope.

It is possible to get the Sun in the field of view by holding a piece of card behind the telescope and then adjusting the instrument until the smallest possible shadow is cast upon the card. This is easier with some telescope designs than with others and some NAS members have purchased specially made finders which they fit to their scopes to help them find the Sun.

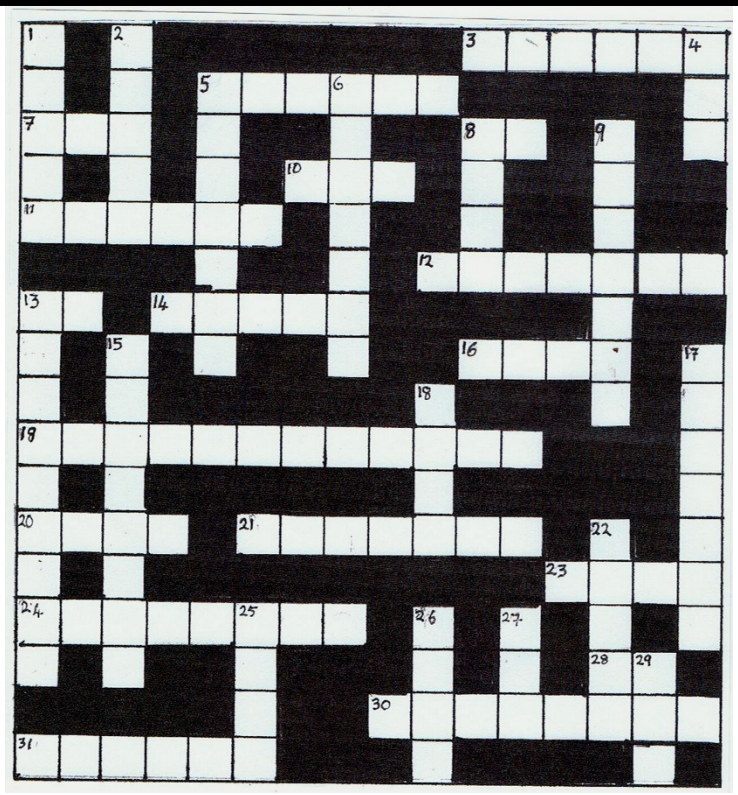
Not so Barry Dingle, who very sensibly kept his money in his pocket and made his own finder, using a piece of aluminium sheeting. The diagrams below show how simple it is to make one of these 'dinglescopes' which can be fitted into the bracket that normally holds your scope's finder.

Once completed it is fitted to the telescope with the end with the 2mm hole pointing towards the Sun. The Sun should then be brought into the scope's field of view by using the shadow method. When this is done you will see a tiny image of our star falling on the rear 'screen' of the Dinglescope. Using a permanent marker, put a dot where this image falls. The Dinglescope is now complete and all that you will need to do in future to locate the Sun is to point your scope towards the Sun, adjusting it until the image of the sun coincide. Well done Barry!

Have any other members made astro equipment of their own or have ideas they would like to share? Don't be shy, send them to the editor!



SPADGER'S CRYPTIC COSMIC CROSSWORD



ACROSS

3. Select a high point on Dartmoor to see southern constellation? (6)
5. Wildebeest see why first and get cross. (6)
7. Suitable beast to sire a sign of zodiac. (3)
8. Greek letter is good enough to eat. (2)
10. Behead wolf's cry for nebula. (3)
11. In the Albert Hall eyes were on famous astronomer found there. (6)
12. A Greek with a bear. (7)
13. Wavelength for solar observation is a bit of a laugh. (2)
14. Mickey's pet has been demoted. (5)
16. We hear a girl on the Moon but she appears to be a nag. (4)
19. Lunar barrier is not gay. (8,4)
20. Lunar crater doesn't sound like paradise! (4)
21. I sup tea, giddily, in orbit around gas giant. (7)
23. Moon effect leaves us in knots we hear . (4)
24. Strangely ties road between Mars and Jupiter. (8)
28. Go back for short objective. (2)
30. Confused a ride before Sun coming up gives you a flower in the sky. (8)
31. Be correct for description of Sirius for instance. (6)

DOWN

1. Keen observers will se and hear the planet in this. (5)
2. Short Albert may be a star but he's not rated as an actor.(5)
4. We hear Greek letter propel a boat. (3)
5. Put headgear on female jazz singer- a real star. (7)
6. Saucily displays a fresh bare bottom. (3, 4)
8. Eggs back up to parking sign to find star. (4)
9. See 18 down.
13. Muddled he shored a nebula (9)
15. Weight watchers' chocolate bar? It fell from the sky. (8)
17. Roman craft precedes lion to astronomer. (7)
18 & 9 down. American down to small change on Moon. (4, 7)
22. Item of climber's kit left on Mare Imbrium. (5)
25. The cloud sounds as if it should be there. (4)
26. Endless avian takes tea to become lunar crater. (4)
27. Stellar colossus might be this hue. (3)
29. Raise drinking vessel to huge emission nebula. (3)

Answers in next Cygnus.

Public Evenings and Members' Talks

The dates of the autumn/winter public evenings and of members' talks are given below:

As yet there are few details regarding the speakers and none of the subjects of the talks are known at this stage. As soon as these are known they will appear on the website and in Cygnus.

PUBLIC OPEN NIGHTS

3rd/4th October—*How Deep is a Black Hole?* - Andy Gardiner
31st October/1st November
28th/29th November
9th/10th January –Possible *Star Gazing Live Extra Time*–Dave Balcombe
6th/7th February– *The Underworld of Stars*
6th/7th March
3rd/4th April– *New Horizons Pluto Arrival*—Mark Shepherd

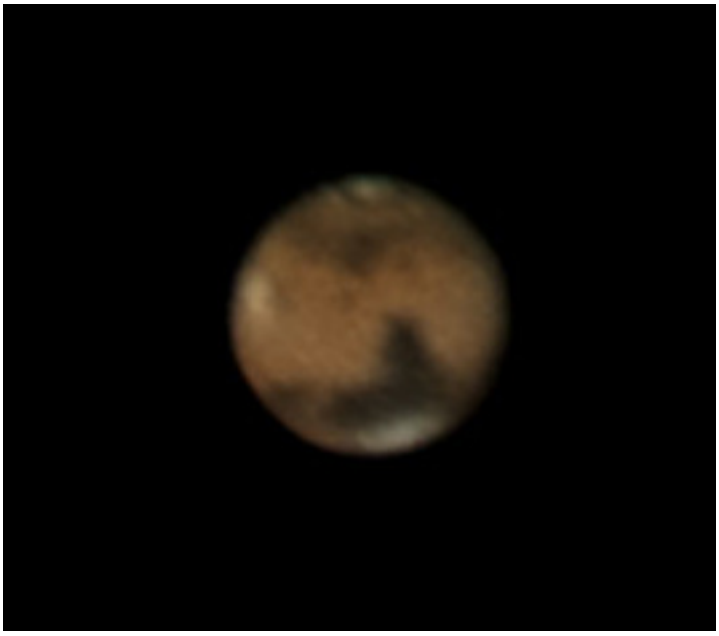
MEMBERS' TALKS

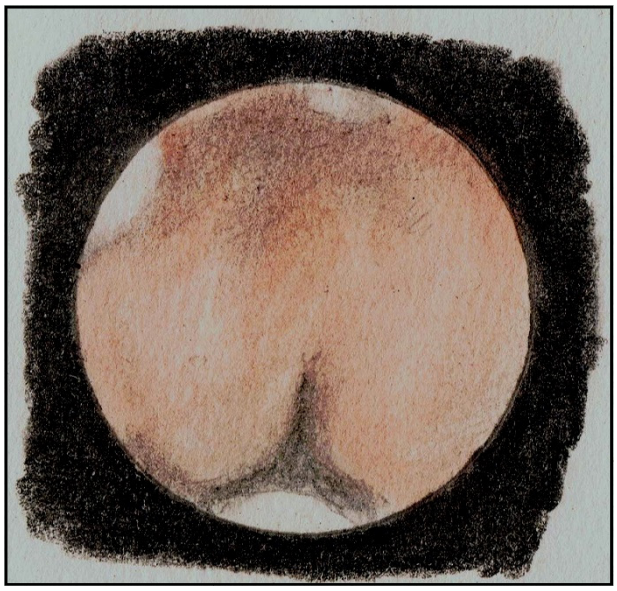
7th November—*What's Up in the Night Sky*—Andrew Robertson
10th November—*The Cool Universe, Infrared Astronomy*—Carolin Crawford
5th December—*What's Up in the Night Sky* –Andrew R.
30th January 2015—*What's Up in the Night Sky*-Andrew R.
27th February 2015—*Voyager—Where No Probe Has Gone Before*—Paul Money
13th March– Nik Szymanek
27th March– *What's Up in the Night Sky*—Andrew R.
24th April— *What's Up in the Night Sky*—Andrew R.
31st. July—*What's up in the Night Sky*—Andrew R.

THE DEADLINE FOR COPY FOR THE NEXT ISSUE OF CYGNUS IS 5th December 2014

This is the very latest date by which articles should reach the editor (chairman take note!).
Sooner than that would be much appreciated and would make the old chap smile!

BONUS PAGES





Once again Mark Turner and Graham Sparrow offer samples of their work for comparison. The two pictures of Mars featured here were produced on the same night in April this year, Graham working in pencil, Mark in pixels.

Top of page is the image Mark Casto set as a challenge to those who attended his astrophotography course. The lower image is Paul Fearn's winning response to that challenge.

Above:

Tom Latham's image of the perennial favourite M13.

Left:

Sue's Solar Suggestions?

Another picture from the Solar Day, Sue Napper talking to a visitor.

(The editor is especially pleased to see that she was showing him a copy of Cygnus!)