February 2008
Volume 13 Issue 2

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Presidents Report

John Rombi

"I'm back" With my absence from *Prime Focus* last month, our very capable (handsome?) V.P Martin Ferlito brought you all the news that was fit to print.

Thanks Martin, I should take a break more often!!!

A big thank you goes to last month's speaker Chris Malikoff (member) Chris brought to us a very detailed run down on the telescope array at Narrabri; this was accompanied by beautiful images taken by Chris & Jenny.

Very well done guys!!! More please!!

As I sit here at my computer on this Sunday morning (of a Forest weekend) at home, I'm happy that the three people that made the trip to the cabin had a clear night. The temperature at the moment (7am) reminds me more of winter than summer, it is only 10C!!

Speaking of observing……..well, that's about all we've been able to do lately. My poor scope sits in the corner of the lounge room forlorn, it hasn't seen the stars for nearly three months, "*Huey please turn the taps off for a while"*

Martin has been working very hard to bring us the M.A.S. t-shirts& caps. He will have some samples on hand tonight, so please keep those designs coming in.

March 1st is nearly upon us and that means that yearly membership fees are due for payment. If you would like to avoid the rush, please see our treasurer Dick Everett, he will be happy to relieve you of your money.

If you have joined M.A.S since October last year, your fees are not due until March 09.

MAS Committee

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With our A.G.M. (April) fast approaching, I would like you to consider a position on the committee. If you would like to be at the coal face formulating decisions to take M.A.S into the future, then do I have a job for you.

Nomination forms are available on the side table near the door.

Tonight

Our speaker will be Associate Professor Geraint Lewis from Sydney University; his presentation will be on "*Galactic Cannibalism"*
I would like to thank Geraint for taking time out from his busy schedule to pay us a visit.

Finally

I hope I don't have to finish building that ark in my backyard, and that we can get back to some semblance of an observing schedule soon.

Clear Skies (I hope)
John Rombi.

Macarthur Astronomical Society Annual General Meeting

Monday 21st April 2008
7:30pm

If you are interested in taking on a position on the executive Committee please make sure you submit your completed nomination form ASAP.

If you have any questions regarding any position on the committee please ask any current committee member.

Observing Dates

March
1/03/08 Stargard
17/03/08 General Meeting
8/03/08 The Forest
29/03/08 Stargard

April
5/04/08 The Forest
21/04/08 AGM
26/04/08 Stargard

May
3/05/08 The Forest
19/05/08 General Meeting
31/05/08 Stargard

June
7/06/08 The Forest
16/06/08 General Meeting
28/06/08 Stargard

July
5/07/08 The Forest
21/07/08 General Meeting
26/07/08 Stargard

August
2/08/08 The Forest
18/08/08 General Meeting
23/08/08 Stargard
30/08/08 The Forest

September
15/09/08 General Meeting
20/09/08 Stargard
27/09/08 The Forest

October
20/10/08 General Meeting
25/10/08 Stargard

November
1/11/08 The Forest
17/11/08 General Meeting
29/11/08 Stargard

December
20/12/08 Stargard
27/12/08 The Forest
TBA - Xmas Party

Royal Stars

Ian Cook

During the Persian empire of 3000 B.C., four stars came to be known as the ROYAL STARS or the four guardians of heaven. These stars supposedly controlled, or watched, the activities of all other bright stars in their quadrant. The four stars marked the cardinal points, solstice and equinox, of that era. They were used as sky navigation points by ancient cultures.

In modern times, these four are still used in ocean navigation, in the air, and some are even used for navigating in space flight.

Due to precession, they no longer appear in tune with their original seasons. Over this year, we will look more closely at these Four Guardians Of Heaven, beginning with the one rising in the East this month.

The Watcher Of The South.

REGULUS (Alpha Leonis) *marked the Ancient Summer Solstice for the Persians and Greeks. Regulus is located just to the north of the ecliptic line, so it appears to 'watch' the south from the northern hemisphere. From this position the summer sun is in the southern sky, therefore the alpha star of Leo is the 'Watcher of the South'.*

Glowing at the heart of Leo the Lion, one of the great constellations of the zodiac, Regulus is not one of the brightest first magnitude stars. It marks the bottom of an asterism called the "sickle of Leo," a curve-shaped figure that looks like a backwards question mark, also outlining the head of the celestial lion.

3000 years ago Regulus lay very close to the northern summer solstice. The ancient Babylonians thought it was the cause of summer heat. In the southern hemisphere, Regulus in Leo appears upside down in
March and due to precession, it signals our **Autumnal Equinox.**

The star is almost exactly on the ecliptic path of the Sun, and is regularly covered by the Moon. Therefore, it is a 'lunar star' and listed in navigation tables of all nations.

The Latin name means "the little king," the reference to a kingly star going back to ancient times. Regulus is the Leader of the Four Royal Stars and is said to rule the affairs of the heavens.

Nations like the Babylonians, the Persians, the Arabs, and many others have called it names like the King, Mighty, Great, the Hero, King of the celestial sphere, the Centre, "the Lion's Heart",

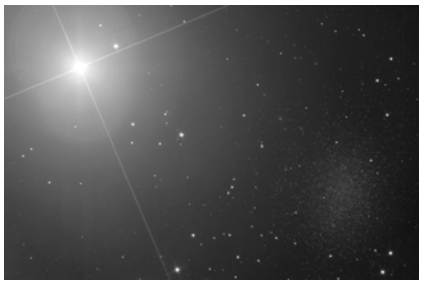
down through the ages. Copernicus followed this theme by giving the star its modern name 'Regulus' meaning "Rex" or King.

Regulus is a "main sequence" star, a so-called dwarf like the Sun. Although technically a dwarf, Regulus is a B class spectral type star visually 140 times brighter than the Sun. When the star's ultraviolet radiation is taken into account the total luminosity climbs to 240 times brighter. Fuelled by internal fusion of hydrogen into helium it shines in our sky at magnitude 1.35.

From the temperature of 12,000 K. combined with its' luminosity and direct measurement of its' angular diameter we know it is 3.5 times larger than the Sun. Currently 77 light years away, Regulus is moving towards Earth at nine km/second.

Regulus has a low mass; wide orange-red distant companion located at least 4200 astronomical units away from it with an orbital period of at least 130,000 years. The companion is itself a double separated by at least 95 astronomical units in a thousand year orbit. Both stars are less massive and dimmer than the Sun. The brighter is an orange dwarf, while the fainter is a red (class M) dwarf that was seen as blue-green by many stargazers 150 years ago.

Looking from the little double, Regulus would be a brilliant star six times brighter than our full Moon.



For decades, scientists knew that Regulus was spinning much faster than the Sun. Early in 2004 a group of astronomers, led by Hal McAlister, director of Georgia State University's Centre for High Angular Resolution Astronomy, (CHARA) used the centre's array of telescopes to detect rotationally induced distortions in Regulus.

The CHARA array, located atop Mt. Wilson in southern California, is composed of six one meter diameter telescope mirrors in the shape of a "Y," with the outermost telescopes about 200 metres from the centre. The optically linked array functions as a single telescope of enormous size.

Scientists have measured the size and shape of Regulus, the temperature difference between its polar and equatorial regions, and the orientation of its spin axis.

Most stars rotate sedately about their spin axes. The Sun, for example, completes a full rotation in about 24 days, which means its equatorial spin speed is roughly 4,500 miles per hour.

The diameter of Regulus is about five times greater than our Sun and its equatorial spin speed is nearly 700,000 miles per hour. Regulus bulges visibly at its equator, a stellar rarity.

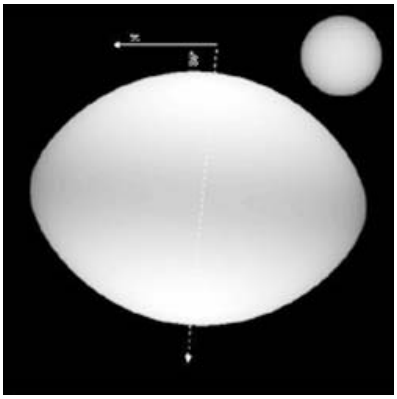
Astronomers viewed Regulus for six weeks in 2006 to obtain interferometric data that, combined with spectroscopic measurements and theoretical models, reveals the effects of its incredibly fast spin.

Regulus' centrifugal force causes it to expand so that its equatorial diameter is one-third larger than its polar diameter. In fact, if Regulus were rotating about 10 percent faster, its outward centrifugal force would exceed the inward pull of gravity and the star would fly apart.

Because of its distorted shape, Regulus, which is a single star, exhibits "gravity darkening", i.e. the star becomes brighter at its poles than at its equator. This phenomenon was previously detected only in binary stars.

The darkening occurs because the star is colder at its equator than at its poles. Regulus' equatorial bulge diminishes the pull of gravity at the equator, which causes the temperature there to decrease. Researchers found that the temperature at Regulus' poles is 15,100 degrees Celsius, 5000 degrees higher than the equator's temperature.

The temperature variation causes the star to be five times brighter at its poles than at its equator. Regulus' surface is so hot that the star is nearly 350 times more luminous than the sun.



CHARA researchers discovered another oddity when they determined the orientation of the star's spin axis. When viewed from the equatorial plane the spin axis is tilted about 86 degrees

from the north direction in the sky. However, the star is moving through space in the same direction its' pole is pointing.

This means Regulus is moving through space towards earth like an enormous flattened spinning bullet at nine kms/second.

For thousands of year's earthly humans looking to the sky did not realise the Watcher of the South had them centred in the celestial target finder.

IC Stars

Dear Editor,

I joined M.A.S. just over a year ago. Soon after I joined, a guest speaker was the only person who could answer a question I have asked a number of experts. He gave me a simple answer to a seemingly complicated question.

I asked him what colour would ultra-violet appear if we could see it? Would it be the same colour as half its frequency in the visible spectrum? (our retinas can detect u.v., but our corneas are opaque to it) He told me no, it would just appear blue. I used the analogy of sound, a music note at double the frequency is an octave higher. A song sung by a soprano sounds the same but different as the same song sung by a baritone in the same key. The guest speaker was an amateur musician, consequently he was the first to understand my question. He explained that our eyes are not like our ears and do not detect octaves.
Doctor Karl Kruzelniki rang me and said it would take ten pages to answer the question; I think he was confused by my long list of "thought-experiment" results, which made a simple question seem complicated. (Anyone who wants a description of my "Thought-experiment", feel free to ask me at the next meeting.)

Question:

Why is east and west on the Moon the opposite way around to the rest of the sky? Looking up at the sky we see east and west matching the compass points on the ground, as if reflected in a mirror above our heads.

Apparently in the past, the direction on the Moon were a mirror of those on the ground. Two of Arthur C. Clarke's novels mention the Sun rising in the west. I found a map of the moon in Southern Astronomy magazine (Jul/Aug 1992) on which east and west were a mirror of those on the ground. When was the change made and why?

(What a shame I was looking forward to writing a best-selling novel starting with the words:- "As the sun rose slowly in the west")

Yours Sincerely
Stuart Cant

Star Hopping to Messiers

Bob Bee

To some amateurs, the Messier list is old hat, passé, been there – done that. To others it is a new adventure. This series of articles is aimed at the latter, and possibly some members who had some trouble finding that odd elusive M object. I hope to provide simple directions, with supporting charts, of how to **star hop** to each Messier object, get it in your finder scope or at least aimed at it and then find it in your scope's eyepiece. At the risk of telling our old hands how to 'suck eggs', I will be going back to the most basic directions and moving on from there.

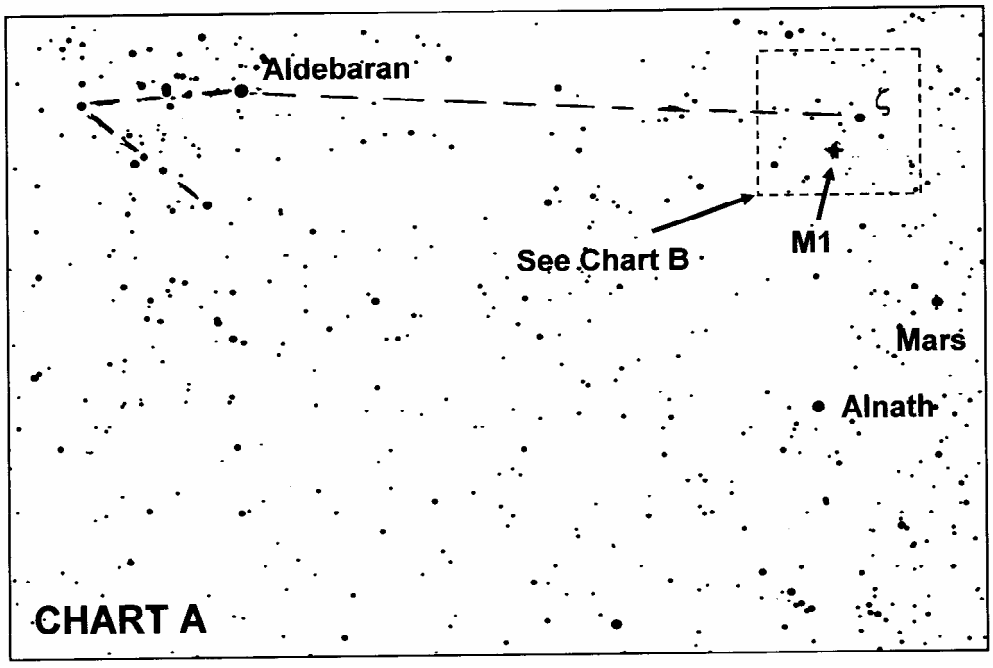
I aim to go through the whole catalogue progressively. It will obviously take more than a year. Of course if you already possess a book or charts which does this for you, you're ahead of me so move on to the next article in this journal.

For simplicity, I will tackle them in numerical order so they won't always be observable on the month of that Prime Focus issue. I suggest you hold on to your copies until such time as they are visible. So let's get to it. As an initial reference, can I point you to pages 138-139 in Astronomy 2008 which gives the basic details of the whole Messier Catalogue.

M1 – The Crab Nebula

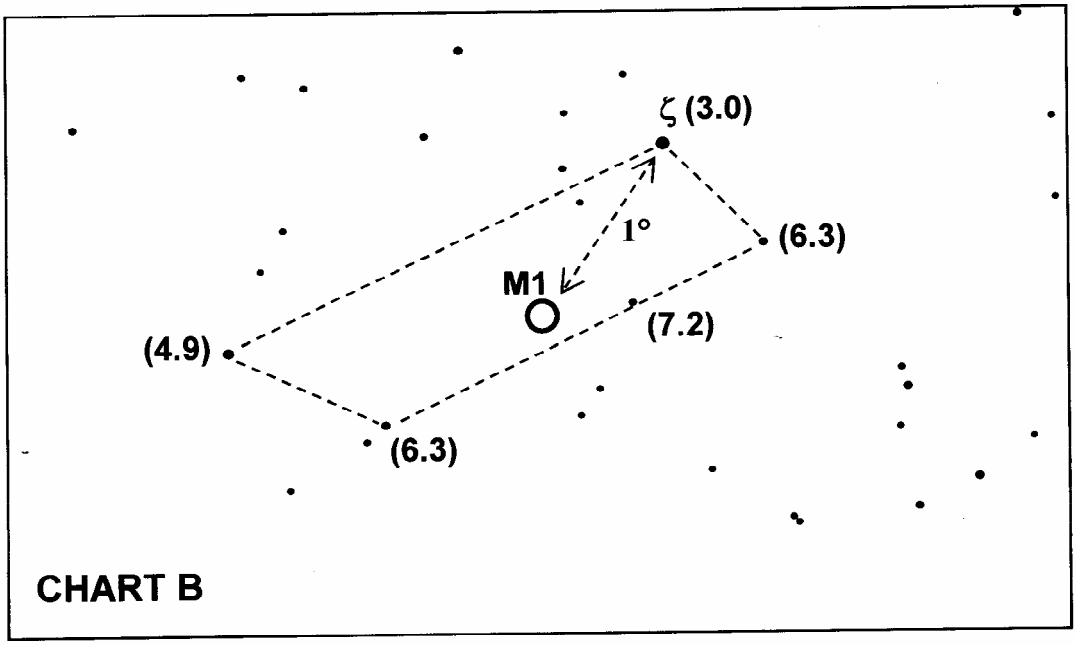
By one of those cosmic coincidences, the first Messier object M1 is ideally observable this month. It is also (for some) very difficult to find. It is located in Taurus and around 9pm in February is almost directly North. M1 is about mag. 9 so you will NOT actually see it in for 50mm finder scope. As a rough first guide to M1, if you extend the top arm of the Big-V in Taurus eastward from the red star Aldebaran by approx. 15°, you will come to a 3rd mag. star, ζ Tauri. This star is one of the two tips of the bull's horns. The other horn tip is β Tauri (Alnath), a 1.7 mag,. star approx. 8° below ζ. (Don't be confused by Mars which this month is mid-way between ζand β Tauri.)

Have you found ζ Tauri? Now get it in your finder scope – see the pattern of stars on the Chart A between Aldebaran and ζ to do that.



Once you have ζ in your finder scope, look at Chart B. You will see that there is a parallelogram of stars about 2.5° across, hanging under ζ. (NOTE: In your finder scope, the view will be upside down so the parallelogram will appear ABOVEζ.)The magnitudes of the key stars are shown in brackets on the chart and these should ALL be visible in your finder scope. Try to identify those stars – the whole parallelogram should fit comfortably in the field of view of your finder scope.

On the 'line' between the two lower mag 6.3 stars there is a fainter mag 7.2 star about 1/3rd way between then. See where M1 is shown on Chart B? It is 1° below and west of ζ, or just above and about ½ way along the lower 'line' between the two mag. 6.3 stars, or 0.5° west of the fainter mag. 7.2 star.



Remember, the view in your inverting finder scope will probably look like Chart B turned around and upside down so the parallelogram 'hangs above' ζ tauri..

Don't be discouraged if you don't see it first time. M1 is maddeningly faint, a wispy cloud at mag. 9. You may have to use averted vision to be sure. Just to remind you – it looks something like this in bigger telescopes. Good hopping!

CCD Killed the Film Star

Noel Sharpe

A long time ago, in a field far away, a little astrophotographer was observed clicking away and busily recording the beauty of the night sky. In the bag would be exquisite objects like Omega Centauri and the Great Orion Nebulae.

At the telescope with camera attached he would sit for hours and hours, checking the exposure times, re focusing between each shot and checking all the alignments. Hours and hours of work well into the cold dark of night, then a trip to the photo lab the next day to eagerly await the results, sometimes a disappointing outcome, sometimes a gem of a photo would appear inter sorted with a bunch of the also rans.

Some great success was achieved early in the piece and the photographer was seeded well in the stellar photography championship. However time has passed, now wanting to re visit all the past glories another set of exposures were required.

Now with a bigger and brighter telescope he was ready, film loaded and alignment all in place, focusing was not a problem and his new scope was ready, willing and able. The night went well but the end result was devastating, out of all this effort came a revelation and well worth a heed to the unwary, bigger is sometimes not better!

A Lot Went Wrong

Well a lot did go wrong that night and it all has to do with a little something called a focal length. Taking great images relies on reducing the margin for error to the absolute minimum.

I had an idea that something wasn't quite right; I had earlier altered a simple finder scope and coupled it with a 12 ml eyepiece and a Barlow lens. I thought that would give me a great deal of magnification well and truly above my 12-inch telescope. The large scope would accept a camera straight into the focuser and be used at only prime focus.

It seemed a simply idea, get the best alignment I can, guide the telescope motors to reduce errors by using the finder scope and just place a camera in the 12 inch for prime focus shots, i.e. limited magnification with no eyepieces involved, just the curve of the mirror shooting a light stream to the camera.

I ended up scratching my head, for during the night the image of the moon in the telescope was bigger, with no magnification in place than it was in the heavily magnified finder scope. Of course the results of all my endeavors were a whole bunch of squiggles, which really didn't look like anything, well maybe I could pass them off as pictures of glowworms.

The Think Tank

So why is this so! Well I have come to the conclusion that these big focal length scopes produce a basic image that is very prone to the smallest of tracking errors, the longer the focal light path the bigger the basic image. So a giant 25 inch scope at say a focal length of say 3 metres would give very strong magnification and of course more rapid movement of any object in the eyepiece or for doing prime focus photography.

Film photography would be most difficult in such large scopes; by the way the best photos I have ever taken were with a telescope focal length of just half a meter, the 12-inch scope I have mentioned earlier has a light path or focal length of one and a

half meters. There is a lot more to tell about the whys and wherefores of telescope photography but for this article I have kept the info as basic as possible.

Give Up Now!

Given what I have said the old-fashioned manual film photographer cannot compete in the world of the CCD camera, or digital maxi star you beaut 60 frames per second auto guided thingy.

Tracking along at a snails pace for a single exposure of say 15 minutes was the norm in my hey day, but now these highly sensitive latest technology cameras plugged into a laptop will not only guide the telescope tracking for you but also click away at say 40 frames a second or more, that's 36,000 exposures for 15 minutes work, not bad at all.

The computer programme then allows you do select the best most perfect image of just one frame and then automatically selects all the other perfect images out of the remaining 35,999. The computer programme will then stack all of these together and Bingo!

These are the days when the costs for all these gadgets are coming down and you get immediate results, we have some great exponents of all this technology in the club, just check the astrophotography section on the website.

As for me, well I am giving up, throwing in the towel, picking up my bat and ball and going home, I have had enough. I will watch these guys on the field with their laptops and big batteries, good luck to them I say as I deem myself to be a relic of the past!

Yours defeatedly

Noel Sharpe

Prime Focus Article Submission

Deadline for article submissions for the March edition of Prime Focus is

Monday 10th March 2008

All Articles can be submitted via email
cyberpiggy@optusnet.com.au
Or via snail mail to the MAS Postal address

Thanks to all the contributors for this month…….

Note to contributors:

To make the editing of Prime Focus a little more stream lined can I request that electronically submitted documents be saved as **Microsoft Word Documents** (I do not mind which version of MS Word). Don't worry if this is not possible articles will still be accepted in other formats!

With regards to detailed Star Charts – these look great in your submitted documents and fantastic when printed in colour but unfortunately do not look so great when printed and photocopied in B&W, if possible if you are including a Star Chart can you please bear this in mind and not create the chart on a black background.

Seeing Double ~ Canis Major

David Hall

…. I keep saying that I am not a dog person but here I am doing doubles in Canis Major. Canis Major (CMa) is Latin for greater dog and is a very prominent constellation in our skies at the moment. This particular dog is one of the two hunting companions of Orion, the other of course being Canis Minor. They both follow their master across the sky chasing Taurus the bull. The only Messier object in CMa is M41, a massive open cluster which is well worth a look at. That said there are plenty of other open clusters in the constellation that are worth looking at too.

This constellation is host to the brightest star in the sky, Sirius. This star is a super brilliant -1.46 magnitude and is easily the easiest star to spot in the sky… It also happens to be a pretty famous binary. Sirius is also known as the Dog Star, which leads us on to our list for this constellation….

1. sirius -1.46/8.5 3.7" – this is an infamously difficult double to split and I will come back to it in a later edition of Seeing Double. Feel free to have a go though.

2. shj73 5.79/7.38 17.8" - well after the near impossible Sirius I thought I'd give you all an easy one. This is a lovely double that's fairly bright and not too far from Sirius. The primary shows as an orange star and secondary blue in my telescope. Very nice.

3. s541 7.48/5.53 23.3" - another easy one for you. This time we have 2 unequal yellow stars. yet another gem in the constellation of CMa.

4.hwe16 8/9.5 4" - a double within a cluster? how cruel. this one sits just on the outskirts on the famous messier 41 which in its self it a great sight in any telescope. The main stars of this cluster are about magnitude 8 of which there are about a dozen, the rest are much fainter. Anyhow the double shows the main star as a yellow and the secondary as a possible blue or white (it was hard to tell in my scope as the seeing wasn't great at the time.).

5. cpo7 1.5/7.5 7" - now here's a pleasant surprise. I have to admit that when I saw this in cartes du ciel I didn't think it would be that great but curiosity got the better of me. Now I am glad I made the stop... this one is really really nice! The primary is a brilliant white and the secondary while quite dim in comparison is just far enough away to be not drowned out thus making an easy but very pretty split! Oh the secondary looks red! Wow! Its a little carbon star!

5. cpo7

6. bu20 7.83/9.9 3" - right near the infamously hard Sirius is a small gem, bu20 is' like a hole heap of doubles her comprising or quite colorful stars. The A star is a brilliant orange and the B is blue creating a nice contrast.

7. stf997 5.27/7.14 3.6" - brighter than the last this couple is a bright yellow and its partner a clean white and is an easy split for the novice.

8. lal53 7.73/7.61 3.0" - like a possum caught in headlights these 2 equal stars stare down the EP at you. because they are equal or close enough to it this pair is an easy split. they are both white. if you do this one at low mag you will notice how nice the surrounding star field looks.

9. bu199 7.21/8.05 1.7" - not put in here just for their closeness this pair do actually look quite nice. they are close however and require a bit of magnification. I got a clear split at 133 mag in seeing that was quite good (6-7/10).

10. coo36 8.51/9.29 9.4" - a fair spread on this here so low mags can be used. The primary looks white or blue and the secondary might be carbon... how about you tell me!

Well that's it for this constellation. There are heaps more doubles there and I am amazed by how pretty some of these are. Happy hunting and sharp splitting!