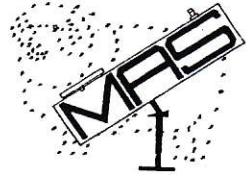


MACARTHUR ASTRONOMICAL SOCIETY Inc.

Journal



# PRIME FOCUS

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## President's Report

It's that time of year again when we attend to the formal requirements of our Annual General Meeting. Afterwards our guest speaker will be Dr Ragbir Bhathal from the University of Western Sydney. Also if time permits we might hear from Peter Druery about the latest goings on in the Astronomical world.

Next month Bob Bee will be our guest speaker and his subject of choice will be that immensely controversial subject titled "Cosmology."

## Last Month

The format of the discussion groups seemed to work well and I've received many favourable comments suggesting we should hold them again. Maybe we could schedule this for a few months time. Peter kept us informed

with the news as part of his regular segment. My thanks go to all who made last months meeting such a success.

Observing-wise it's been a complete waste of time as the weather has been atrocious to say the least. How long can this situation last? The upcoming Airfield nights hold the promise of clear dark skies and as winter approaches I'm hopeful of more conducive conditions.

The open night held at the Observatory went very well with a huge crowd of eager stargazers keen to view the heavens. Our thanks to all members who made the night one of the really big ones.

I will sign off here as according to requirements I have a responsibility to prepare an AGM report to the membership, so good luck and

lets be hopeful of some clear skies!

Noel Sharpe  
President

## President's AGM Report

Our society is founded strongly on the contributions made by our members. The efforts made have been simply outstanding to say the least. Additionally, there are members who have been working actively behind the scenes who have imparted encouragement, support and words of wisdom. This can only mean that our society is in sound hands not only now but well into the future.

In reviewing the Society's activities over the last 12 months it is evident that it has been one of our most productive years. Not only have we been active in the



public education area but we have many new members who are eagerly armed with telescopes ready to tackle the night sky.

The various telescope retailers must be very happy with MAS as quite a few members have significantly upgraded to bigger and better scopes, some at considerable expense. What this means is our core membership is increasing and this ensures long term relationships with the Society. It also creates friendships and allows us to progress our overall astronomical knowledge and telescope usage.

### **Speakers at our General Meetings.**

The year in review reflects what a great contribution our own members can bring. Enthusiastically they convey to us a wide range of astronomical subjects and interests. My appreciation and acknowledgements go to the following members.

**Dr Ragbir Bhathal**, new directions for SETI  
**Dick Everett**, Filters, Camera Tracker, Collimation  
**Phillip Kidd**, Early Astronomers  
**Ned Pastor**, 6" refractor telescope  
**John Rombi**, Slides of the night sky, constellation objects  
**Ian Cook**, Quiz night, Double Stars and locating constellations

**John Casey**, Cosmology discussion group  
**Peter Druery**, latest discoveries, research items and news.

### **Our external speakers as follows.**

**Dr Fred Watson**, Anglo-Australian Observatory, May public night  
**Peter Williams**, Variable star research  
**Don Whiteman**, President of NSW Astronomical Society on collimation of telescopes  
**Dr Russell Cannon**, Astronomer Anglo-Australian Observatory, on update of the 2df project

At this point it would be very remiss of me not to publicly thank **Daniel Ross** for the effort he makes in having the coffee, tea and biscuits available for us every month. Thank you on behalf of all the coffee lovers. It's a great way to close the night and have a chat. Well done!

### **Public Education**

We have held 8 Observatory Public nights. Some of these have been very well attended. In April last year over 400 people gazed into the night sky, in May 150. The recent open night held on March 23<sup>rd</sup> saw about 250 members of the public arrive.

Election night and a football final, combined with some really bad weather, accounted for the nights when crowd

numbers were down. Sometimes it's hard to predict and at times our resources can be stretched. My appreciation goes to all members who contribute to these nights.

Public Education in astronomy can take many forms. One such example was the when strange orange lights invaded Campbelltown. The resulting media coverage given to the capture of one of those objects by a certain MAS member added some very valuable input into the debate.

### **Other Educational Events**

Briar Road Public School, Airds.  
 Koshigaya Japanese exchange students.  
 William Carey Christian school, Liverpool.  
 International House Belanglo Forest.  
 Macquarie Public School.  
 Liverpool Probus Club.

Our appreciations go to all of our members who have contributed to these nights, just fantastic.

### **Other Matters**

We also had extensive planning go into our field nights at the Airfield. My records show that at least 10 such occasions were made available to us. However, the weather has been a major draw back for us.

Our first away mission was at International House in the



Belanglo Forest. However, the weather was a misery, but it was a great chance to relax and have some fun. We now hold our expectations high for our return in June.

### In Conclusion

My tenure as President has been a most rewarding and enjoyable one. This would not be possible without your support and encouragement. In particular the outgoing committee has striven to create a strong sense of teamwork and this has certainly taken some responsibilities from me and lightened the load so to speak.

I would like to make mention of the many members who have made belonging to MAS very worthwhile. In wishing to publicly acknowledge them I hope I have not forgotten anyone for their contributions and if so I do apologise.

Lloyd Wright: Library, field and open nights.

Chris Barnett: news from the Internet.

Dick Everett: Mentor, speaker, telescope gadgets.

Bob Bee: Prime Focus editor, Heavens Above newspaper series.

Peter Druery: Observatory, Latest news, guest speaker roles.

John Koster: Open nights and keeper of the books.

Ian Cook: Education, writer of Prime Focus articles 'What IC this month.'

Daniel Ross: Education, Tea and Coffee, proud owner of a really big telescope.

Attila Kaldy: astro-photographer, open nights and encouragement, thanks Attila.

Ragbir Bhathal: for making the impossible possible, The Rotary Observatory.

John Casey: all things cosmological.

Phil and Samantha Kidd: Open and Public nights.

Ursula Braatz: Holiday insights for Prime Focus

I reserve my final acknowledgement to John Rombi who has been my Vice President over the last 12 months. John's companionship and support is greatly appreciated. At times he has had to fill my shoes at the last minute, or been there to take hurried phone calls which often entail off loading a bunch of tasks. With my new found family and work responsibilities I could not function for the society without an able bodied VP. Thanks John.

So in signing off please enjoy your stargazing and astronomical activities, take care, and thankyou to everyone for your support.

Kind Regards

Noel Sharpe ■

### Vice President's A.G.M. Report

Well another fiscal year has passed for our Society; we the members have had a varied year of trials and tribulations.

### Observatory Nights

A group of between 8 to 10 members made themselves available once a month for the public education nights at the Campbelltown Rotary Observatory. Unfortunately, for the majority of the year the nights were compromised by the weather. The enthusiastic astronomers treated the people that still attended to personalised service; this helped raise the profile of astronomy in the Macarthur area. Thankyou to all the members that contributed their time and knowledge to these nights.

### Public Night - March 23<sup>rd</sup>

Ragbir Bhathal and Peter Druery were in charge of the 16" observatory scope, while Lloyd Wright, Daniel Ross, Phil and Samantha Kidd, Attila Kaldy, Bob Bee, Dick Everett and myself manned our own scopes. About 250 very keen members of the public, of all ages, inundated us. We also had a small group of overseas visitors that were fascinated by our "upside down constellations".

The night was to finish at 10.00pm, but at 10.45pm quite a number of us were still in earnest conversation with our guests.



Whenever I had a moment to myself (and that didn't happen very often) I saw at least 15 people on the end of each line leading to the scopes. The greatest surprise of all was that **MOST OF THE NIGHT WAS CLEAR.**

### **The Oaks**

These nights too, were affected by the weather for the first six months of the year. The redeeming factor was that the group of members that did attend were treated to evenings of challenging and fun conversations well into the early hours of the morning, huddled around a fire trying to stay warm. On the odd occasion when the stars poked through the clouds, the astronomy starved stargazers made good use of the time.

### **M.A.S. 100 Marathon**

We held our first marathon on the 16<sup>th</sup> September; there were 8 members that took up the challenge. But by the time the sun peeked over the eastern horizon, only four members had survived the night, Dick Everett, Daniel Ross, Lloyd Wright and yours truly. I hope that more members take up the challenge this year (July) and that it becomes an integral part of our Society.

The M.A.S. Marathon consists of 82 Messier and 18 N.G.C and I.C objects of varying types and sizes. I hope to be able to help as many of our members both long standing and new to be able to increase

the challenges in their observing schedule.

### **Messier 100 List**

The Messier list of 100 objects is another challenge that was taken up by several members. The sighting of these objects is spread over the entire year as the constellations come into a favourable observing position, and it allows the participants to gain an understanding of what is available and when.

### **Acknowledgements**

Firstly, I would like to thank all members of the committee for the time and effort that they have committed to the successful running of our Society. Without your hard work I'm sure that the members would not enjoy such a vibrant club like ours. To all the friends that have helped me with numerous bits and pieces over the year, a **BIG THANKYOU TO YOU.**

To the general membership, please make your thoughts and ideas known in whatever arena our club allows (Prime Focus, General Meetings, Observatory Nights, Oaks Nights and of course you could always consider a Committee position.) Remember, your input and new ideas are very important. I know that the next year will be bigger and better than ever.

John Rombi

## **Super Massive Black Holes**

The second type of black hole to be discovered was the Super Massive Black Holes (SMBH.) Containing more than a million or billion solar masses, they are the largest objects known in the Universe. Only found at the centre of galaxies so far, there is still mystery as to how or when they formed, but every galaxy examined has a black hole at its centre.

Did galaxy matter coalesce gravitationally and trickle gradually to the centre to form the black hole or did some massive objects like neutron stars or a cluster of stellar black holes merge? Alternatively did the Big Bang create 'seed black holes', and form the first generation of very massive stars around them? The fact that it is common for the mass of a SMBH to be 0.2% of the mass in a galaxy suggests that the black hole may have come first and in some way governs the size of the galaxy.

Observations from the Chandra X-Ray Observatory in the X-ray spectrum enable us to measure the density (mass) and size of some black holes. When matter is pulled over the event horizon of a black hole it is heated to millions of degrees and produces X-rays. These X-rays create a radiation pressure pushing outwards on the matter. If a known mass of



matter continues to fall inward, it indicates the X-ray pressure outwards is less than the inward gravitational pull of the black hole. This enables us to estimate the mass of the black hole.

An X-ray flare observed orbiting at the centre of the Milky Way recently has all but confirmed the existence there of a long suspected SMBH. The flare indicated that the black hole was eating. More correctly heated matter was crossing the event horizon into the black hole. The Chandra X-ray Observatory detected the flare to dim and brighten again after 10 minutes. This has allowed astronomers to estimate a mass of 2.6 million suns and a size of 10 light minutes or approx. 150 million km across. The black hole at the centre of our Milky Way is similar in size to the distance from Earth to the Sun.

### Mini Black Holes

A third class of black hole is Mini or **Primordial Black Holes**. Although undetected as yet, are believed by Stephen Hawking to have been formed by super compression (high temperature and pressure) at the Big Bang. Because these black holes are not created by the collapse of a star they could be as small as several kilos of mass all the way up to less than the mass of our Sun.

An alternative theory for galaxy formation thinks mini black holes could have been the rallying point for dust and gas in the forming of those massive stars that exploded and created the first heavy elements.

Primordial BH are considered possible locations for the 'missing' hydrogen and helium which should exist to explain the expansion and cooling of the universe after the Big Bang. They are also named as a possible solution for that unseen (missing) dark matter that would make up the mass of the universe. The theory proposes that 90% of the universe is made up of low mass black holes. The 10% of the universe we see and live in is the waste or leftovers of the real thing, or the bits in between the 90%!

Low mass black holes are certainly possible but it is thought that they may evaporate and disappear after a relatively short time. Whoever heard of a shrinking black hole? Can matter leave a black hole?

Ian Cook ■

### Internet Astronomy

I have obtained some news from the Internet I would like to share with you. This following information comes from the University of Hawaii. The Keck twins have been roaming the skies again and have come up with a

galaxy **15.5 billion l.y** from Earth.

This makes the cosmic theories all mixed up. The Galaxy can be found in the cluster Abell 370. When this galaxy was formed it was only a few hundred million years after the Big Bang - the dark time of the universe, when the hot plasma developed into hydrogen and helium. This galaxy could only be found by using the micro-lensing technique on the other closer members of the Abell 370 group.

### Record Quasars

Two scientists Donald Schneider and Xiaochi Fan have found two quasars **14 billion l.y** from Earth. This is 800 million years after The Big Bang. A rethink of the age of the universe is needed.

### Hobby Astronomy discovers an asteroid close to Earth.

An amateur astronomer from the town Essen in Germany discovered the 2002 E.L6 asteroid on the 11<sup>th</sup> March 02. This asteroid is dangerous, but the risk of an impact is not so big. In this century the chance of a collision is 1 to 30 million. The minor planet monitoring centre has found 386 such asteroids using The Smithsonian Astrophysical Observatory.

Ursula Braatz ■



## What IC This Month

### April 15 – May19, 2002

### Highlights

- 30/4 Four planets grouped in Taurus  
 30/4 Mars and Saturn face off  
 05/5 Mercury, Venus, Mars and Saturn in 10° circle

### Evening Sky Planets

**Mercury** is in the evening sky after superior conjunction and will quickly rise higher each night. On 27/4 it will be the lowest in a line of planets from the west to the meridian. It will be at its highest above the horizon (one handspan) on 4/5 setting just one hour after sunset before zooming down again to pass between the Earth and Sun (inferior conj) on the 27/5. Saturn and Aldebaran will form an equal-sided triangle with it on 15/5.

**Venus** appears in Aries during April and moves to Taurus. On 6/5 it will make a 2.5° triangle with Saturn and Mars, and on the 10/5 will pass just 0.4° from Mars.

**Mars** remains in Taurus with a thin crescent Moon passing only 4° from it on the 16/4 and Saturn coming even closer on 30/4. Saturn will partner ruddy Mars to the dance till 5/5 only to have him stolen by golden Venus from the 11/5. They will both run away to Gemini later in May

**Saturn** has lazily hung around the seven sisters

(Pleiades) in Taurus for months now. But this month he is joined by Mercury, Venus and Mars for a bit of push and shove. Watch them each night as events unfold.

**Jupiter** has started to move eastward again gradually moving into Cancer. On 19/4 a new crescent Moon will be 6° below. On 16/5 the crescent moon will again pass close by before Venus comes to stand alongside Jupiter and dazzle us all at the end of May

**The Morning Sky** contains only **Uranus** and **Neptune** this month quietly waiting there for their support roles in Mar's big show next year.

### Did You Know?

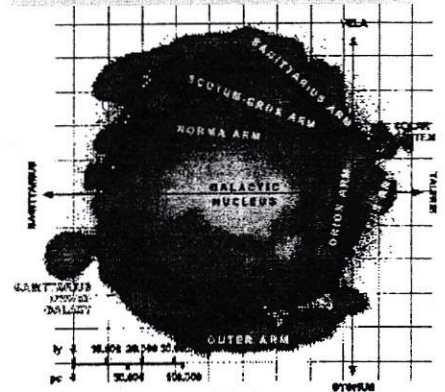
Five or six arm like structures have been identified and named in the Milky Way spiral.

Although there is some dispute and evidence is not easily obtained, the two major arms, the **Sagittarius** and **Perseus Arms**, come from opposite sides of the nucleus. The Sun is on the inner edge of the **Orion Arm**, which could be a spur, or fragment, between the Perseus and Sagittarius arms. You can find some of our family stars in the vicinity of Orion's belt.

From our Sun's position looking inwards to the galactic centre we see the full grandeur of the **Sagittarius-Carina Arm**, which may

include the **Norma Arm** centered on **M24**. Between these two is the **Scutum-Crux Arm**.

Looking outward beyond the Perseus arm there are suggestions of an **Outer or Cygnus Arm** arcing around towards Perseus in a semi-circle and ending in the Cygnus region.



Inward from the Sagittarius-Scutum-Crux arms is a complex region with non-circular movements dominating. This may indicate that our Galaxy is really a **Barred Spiral** with the Sagittarius arm attached to one end and another arm called the **Centaurus Arm** coming from the other side of the galaxy. Perhaps Centaurus is also the Outer Arm. Looking from inside the galaxy it is difficult to be certain of these features, and I guess there will be many surprises as we learn more.

### Meteors

Between 16-24 April you can spot the **Lyrid** shower from 2am to dawn. Although only 15 zhr they can be erratic so it's worth looking 30° above



northeast horizon during those times.

The **pi Puppids** are scarce but bright yellow with smoky trains and fireballs. Max is on the 23/4 about 4-5 zhr and variable.

## Sky Portraits

### Hydra- The Nine Headed Serpent

Hercules was given 12 tasks to redeem himself. One was to kill the Serpent with Nine Heads. Being a straight-forward kind of guy with a club, he thought to bash them off one at a time. However two heads sprang from each bloody stump to replace every one lost. Success only came with the help of his nephew who burned the stumps as Hercules bashed them to pulp. The goddess Juno resented his beginning to triumph, (PMT perhaps or maybe just spiteful), sent a large Crab to distract him by nipping at his heels. However Hercules crushed the crab underfoot and proceeded to finish his task. Cancer the Crab was placed in the sky with the serpent to honour its valiant death.

Hydra is the largest in area and the longest in size of all constellations, snaking from Procyon to Zuben El Genubi, (a relative of Obi Wan?). It takes seven hours to pass overhead. Attempts have been made to break it up or create other shapes, notably

an axe handle with Corvus the head; or in 1805 Felis - The Cat.

Its stars are rather faint with the most noticeable being the Head near Cancer and Alphard in the neck of the animal.

The Hydra Head includes  $\delta$  a mag 4 blue-white star,  $\epsilon$  a yellow/blue double,  $\zeta$   $\eta$  and  $\sigma$ . The first of our Messiers can be found here, although it is not within the boundaries of Hydra. By lining up  $\epsilon$  and  $\sigma$  in the Head and extending out  $10^\circ$  you find **M48** a bright open cluster of 80 stars in a richly sprinkled field of doubles, triples and groups, just visible to the naked eye in clear skies

$\alpha$  Alphard 'the solitary one', an orange giant was called Heart of the Hydra by Tycho Brahe.  $\beta$  is a pale yellow close pair about  $25^\circ$  from  $\alpha$  down along the body of the serpent between Crater and Centaurus.

The stars  $\nu$ ,  $\xi$ ,  $\beta$  and  $\gamma$  that swoop up around the borders of Sextans, Crater and Corvus are called the Green Hill by the Chinese.  $\gamma$  a yellow giant 100 ly distant from us, is on the east side of the Hill toward Libra before the tail. The second Messier in Hydra is found by lining up  $\gamma$  and  $\beta$  Corvus and extend  $3.5^\circ$  to **M68** a rich globular cluster with some spiral structure. 150mm will resolve some of the stars.

Starting from a large arrow head of  $5^{\text{th}}$  mag stars north of Menkent in Centaurus, extend a line  $3^\circ$  to **M83** a large  $8^{\text{th}}$  mag face on spiral galaxy, best seen with 150 mm or larger.

Quite close to  $\mu$  Hya is a good object for small scopes. NGC 3242 **Ghost of Jupiter** is a very bright  $9^{\text{th}}$  mag planetary nebula.

Our next constellation is always running flat out like a lizard drinking, around the south celestial pole.

### Chamaeleon -The

**Chameleon** is a distinct asterism looking like a flattened diamond to the right of Apus. First introduced by our old friends, Dutch navigators, Peter Keyser and Fred Houtman in 1590 it was published on an atlas by Bayer 14 years later.

Chamaeleon contains a star region which is among the nearest to our own Sun, and three of the brightest stars are red, white, and blue. There are two interesting doubles  $\delta$  and  $\epsilon$ . You'll need 150 mm for  $\epsilon$ , but binoculars will show the orange and blue of  $\delta$ . **NGC 3195** is a faint blue planetary nebula close to  $\delta$  on the Pole side, about the same size as the planet Jupiter. A number of other nebulae are visible but faint or small. Sneak up on Chamaeleon one night soon.

Looking to the north, west of Arcturus below Coma Berenices, we find the



## constellation **Canes Venatici -the other Hunting Dogs.**

The two dogs are Asterion and Chara, both held on a leash by Bootes as they chase the Great Bear around the North Pole. It's one of those obscure constellations introduced by Johannes Hevelius in 1690.

With the exception of **Alpha CVn**, the stars are quite faint fourth and fifth magnitude. Several notable binaries can be found, and a number of interesting deep sky objects as well.

**Alpha Canum Venaticorum** is popularly called Cor Caroli (*Heart of Charles*). Most sources give Edmund Halley the credit, naming it after King Charles II after the restoration of the monarchy in Britain in 1660. (Others say it was referring to Charles I, after his execution.) The star has a visual magnitude of 2.9 (variable), a distance of 110 light years, and roughly the same size as our Sun. It is also a good double with a subtle colour contrast of soft blue and yellow, or two shades of white.

### Double stars

Canes Venatici has two attractive binaries. *Alpha*<sup>2</sup> and *alpha*<sup>1</sup> CVn form a celebrated fixed double star system. 25 CVn (Struve 1768) is a visual binary with an elegant orbit of 240 years. Presently, the companion is at near maximum separation, with a separation 1.8".

## Deep Sky Objects

There are five Messier objects in this constellation, and many more deep sky objects worthy of attention.

**M3** (NGC 5272) is a wonderful globular cluster found roughly halfway between Cor Caroli and Arcturus (in Bootes). Considered one of the finest globular clusters in the entire heavens, you'll need a large scope to resolve its individual stars. The cluster is about 45,000 light years away.

**M51** (NGC 5194) or *The Whirlpool Galaxy* is the finest galaxy in Canes Venatici. This spiral is very low to our horizon but can be found just above and to the west from the tip of the Big Dipper's handle. Some say the galaxy is 14 million light years away, others that it is twice that. In any case, you'll need a large telescope and a fine evening to enjoy its delicate detail, which includes an appendage system (NGC 5195), another galaxy seemingly hanging onto one of its extended arms.

**M63** is sometimes called the Sunflower Galaxy, for its numerous arms, which have been described as "like showers of sparks thrown out by a fiery pinwheel". Bright, at 8.1 magnitude, it has a very condensed centre. The galaxy is found 5° north-northeast of Cor Caroli.

**M94** is a spiral seen face-on, and "comet-like". A compact circular spiral and very bright

at 8.1 mag. To find it draw a line between Cor Caroli and beta CVn, and at the halfway point draw a perpendicular off to the northeast. About 2° up this perpendicular is found M94.

**M106** (NGC 4258) is another bright spiral. The galaxy is 6° north northwest of Beta CVn.

Non-Messiers are **NGC 4244**: a large edge-on spiral, found 8° west of Cor Caroli.

Located less than 1° northwest of beta CVn are **NGC 4485** and **NGC 4490** two splendid galaxies in the same field: Sometimes called the Cocoon Galaxy 4485 is more compact while 4490 is larger and brighter.

6° south of Cor Caroli and 2° west is **NGC 4631** a very large and bright galaxy seen edge-on. Just southwest of 4631, in the same field are two more galaxies, **NGC 4656** and **4657**.

Good seeing IC

## Key Observing Dates

Please note the following dates for the coming month:

Observatory Public Nights:  
18<sup>th</sup> May; 15<sup>th</sup> June

Oaks Club Night:  
20<sup>th</sup> April; 11<sup>th</sup> May

Belanglo Int. House:  
8<sup>th</sup> June