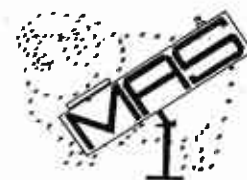


MACARTHUR ASTRONOMICAL SOCIETY Inc.



Journal

PRIME FOCUS

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President's Report

Aussie, Aussie, Aussie, Oi, Oi, Oi !!!

What a month its been, The Olympic Games have sent our city of Sydney straight into orbit and our athletes were rocketed to stardom, I don't know about you but I've been glued to the TV and as such I have had little time to prepare this report so I'll keep it short and snappy.

Last Month

Thankyou to Dr Frank Stootman for giving us an insight into the search for extraterrestrial intelligence. I'm sure all of us appreciated the visit to his science lab, which was just fantastic. Frank has indicated he would be available next year to talk to us about his latest research project.

This Month

It gives me great pleasure to introduce tonight's guest speaker, Dr Fred Watson from the Anglo-Australian Telescope at Siding Springs. On behalf of our members and guests we thank you for taking time to talk to us tonight.

Next Month

A presentation on spectroscopy by Don Neely, with a visit to a science lab to view experiments in this field of astronomical research, it should be great.

We Need You

The director of the Campbelltown Rotary Observatory, our very own Ragbir Bhathal has requested our assistance to hold a public observing night on **Saturday November 4th**, so it's time to rev up the troops. We will need every telescope available for what will be a very big night. At the time of writing

the plan is to set up around the domes and some of us in between the mini Kecks. I'm hopeful of having more details tonight.

M.A.S. Help Desk

I've started a help desk for our newer members in order to give assistance in a way not currently done. It works by obtaining a help desk form and writing down a question you may have. It can be anything astronomical, however we do have a need to provide entry level knowledge on telescopes, observational skills etc.

When completed put it into the box provided. Answers will be compiled in the following month's Journal as others may benefit from the information.

WAACkers Blown Away

On our last field night to Oakdale Farm The Wollongong Amateur Astronomical Club joined us

and were just blown away by what a fantastic site it was. Well, I'm just having a joke here because a gale force wind of about 90km/h did blow us away, including the chairs and star wheels. Unfortunately the telescopes also had to be put away. Last time we met up with the Wollongong club we were set upon by garden sprinklers and got a drenching, (see *Prime Focus: Spiders and Tooth Fairies*, Feb 2000). So we've had **water, wind, what's next? Fire and earthquake!** It was a shame really because there was not a cloud in the sky, and it wasn't very cold either.

I enjoyed the night and made good some personal observations of the Helix and Dumbbell Nebulae, they were just spectacular. I can't believe I've spent 4 years behind a camera at the expense of improving my observational skills, but for me now it's time to reach a balance.

Goodbye for now,

Noel Sharpe. ■

Bob's Globs

The answer to August's Glob quiz: They were, from the top down: M13, M14 and M12.

Spaced Out

S.M.B (Secret Men's Business)

On the 23rd September the male members of the M.A.S tribe ventured out to the hunting grounds of the Oaks Airfield, intent on capturing the many elusive objects of the night sky. Unfortunately the weather had different ideas, and we were confronted by low cloud and fog.

So what do 11 very keen astronomers do when there are no stars to see? Well the topics were varied. We examined Ian Cook's new home made telescope... very nice indeed! We discussed our achievements and frustrations in our observing schedules. Attila and I were very deeply entrenched in a discussion on E.T.s, terra forming and the fate and future of our world, all heavy stuff but very stimulating and a big change from the every day trials of work, money troubles and life's occasional bite on the b...m! There were other topics but I can't mention them here, because of the S.M.B clause. So to all the members that have never been to an observing night, (male or female) please don't feel left out as you will be warmly welcomed, whether your a novice or a seasoned professional, and you might be privileged to sit in on a S.M.B.

Around 10.30 Attila decided to call it a night. About five minutes after he left we started to see some stars,

within 1/2 hour it was totally clear. So we all came to the conclusion that the cloud attracting jinx had left Bob Bee (our Editor) and attached itself to Attila (*sorry Attila*). We all took advantage of the semi-clear conditions and enjoyed about three hours of observing before calling it a night, when the pea soup conditions returned.

The Wind in the Willows

Well it was actually gale force winds that greeted us at "The Farm" on Sept 30th, the sky was clear, but the images in the eyepiece were doing a merry dance that would make Fred Astaire proud (for the younger crowd make that... I can't think of any). We were joined by the goodfellows of W.A.A.C.ers, they brought with them a variety of scopes such as a Televue 4" refractor, 8" S.C., 8" Dob all white and very easy to see in the dark; and a complement of smaller instruments. It was good to mix with a new group of astronomers who were not only knowledgeable, but also had an easy going and friendly style in the same way that the members of M.A.S conduct themselves.

With the Olympics keeping us company on the car radio, the serious observing commenced.

Bob is in the process of writing a book on Binocular Astronomy and on this night he was continuing his research on the objects available with

these instruments. Bob expects the book to be available about this time next year, Good Luck Bob!

Attila, Daniel and Ian's Messier hunting continued with each of them adding between 9-10 objects to their lists, keep up the good work.

Our always energetic President Noel, did his bee impersonation (not Bob) and flitted from one astronomer to another keeping up with everyone's progress and endeavours, and especially to the guests amongst us. Photography was on the menu, but because of the high winds this was postponed to a more suitable night. The buzz of a busy night lasted till about 1 am when the constant buffeting of the high winds took its toll and we all called it a night.

P.S. In the early part of the night the wind took my star wheel for a trip into the very large paddock we were in. Attila and Lloyd, thanks very much for spending your time looking for it everywhere, I eventually found it only two cars down from where I was standing.

John Rombi

Night Sky at Gulgong

A cold clear night in May,
Inching closer to the campfire
To keep the chills away.
One small group of people,
A speck on this vast ground,
Where just beyond the blazing logs
Lies darkness all around.

As you sit in this valley
Covered in by hill so high,
Lift your head, lift your eyes
To the heavens, to the sky.
Then you stand with upturned head,
And feel your body sway
As up above, a million lights
Reach out from far away.

Have you ever seen so many stars
Tossed across the sky in showers?
Not even Vincent,
with his starry night
Could capture, and hold,
this brilliant sight.
Now far from city,
and far from noise,
Tonight with these people
I've shared simple joys,
A drink, and a song, and smoke
From the fire in our eyes,
And over it all,
this heart stopping sky.

Bill Falls

Intensity of Dark

An interesting tit-bit from the book "Cosmological Milkshake" by Professor Robert Erlich is the question: "What is the intensity of dark?" How dark can light get?

The 'darkest' that light can get is a single photon. (One photon less and there is no light.) But... the human eye cannot register single photons. The weakest signal your dark-

adapted eyes can register is about 20 photons at a time.

So, it would seem the darkest light can get is about 20 times fainter than your eyes can register.

Frank Kish ■

...a little Cosmology

The latest news about the accelerating universe... or more appropriately... is the universe accelerating ...?

The startling results two years ago from the two independent teams studying Type 1a super novae that appeared to be 25% dimmer than they should if the universe's expansion rate *was not* accelerating have rightly continued to be challenged – even by the teams that proposed it.

A counter-theory was offered that the Type 1a supernovae actually evolved over the eons (i.e. had different 'rise times' *then* as to *now*) and that this would account for the perception of 'dimmer' SNs.

But the latest analysis of close and distant SNs suggests that in fact SNs *do not* evolve. Which leaves us where? Yep... the universe is still accelerating... we think. ■

Manned Exploration of the Red Planet -Part 2

By John Casey

This is the completion of John's article from the August Issue.

Well, with the Mars Direct mission a possibility, what would you take with you? Robert Zubrin went into a lot of detail in working out such a payload, as can be seen in his table 4.5. reproduced below.

The Mars Direct planning team also came up with a novel way of overcoming zero gravity on the long trip to Mars. Instead of discarding the upper stage of their heavy lift rocket when out of the

Earth's atmosphere, they would detach it from the Habitation payload, by playing it out on a strong tether cable. By firing thrusters, the Hab, and spent upper stage, would begin to rotate about their mutual centre of gravity. To generate Mars' normal gravity (0.38 X Earth's), a separation by 345m requires revolution at 1RPM. At 2 RPM, the separation required is only 86m. Nearing Mars, the tether

can be released, as there is no useful equipment to worry about on the discarded upper stage rocket. Course corrections with the tethered spacecraft only require delta velocity changes of about 20 m/s, and these can be done by pulsed thruster firings along the line of tether, or by continuous low thrust burns perpendicular to the plane of rotation.

Mass Allocations for Mars Direct Mission Plan (Table 4.5)

Earth Return Vehicle	Tonnes	Hab	Tonnes
ERV cabin structure	3.0	Hab structure	5.0
Life support system	1.0	Life support system	3.0
Consumables	3.4	Consumables	7.0
Electrical power (5 kWe solar)	1.0	Electrical power (5 kWe solar)	1.0
Reaction Control system	0.5	Reaction Control system	0.5
Communications and information management	0.1	Communications and information management	0.1
Furniture and interior	0.5	Lab equipment	0.5
EVA suits (4)	0.4	Crew	0.4
Spares and margin (16%)	1.6	EVA suits (4)	0.4
EVA cabin Total	11.5	Furniture and interior	1.0
Aeroshell	1.8	Open Mars rovers (2)	0.8
Light truck	0.5	Pressurised Mars rover	1.4

Hydrogen feed stock	6.3	Field science equipment	0.5
ERV propulsion stages	4.5	Spares and margin (16%)	3.5
Propellant production plant	0.5		
Power reactor (80kWe)	3.5		
ERV	Total mass	Hab	Total mass
	28.6		25.

The consumables requirements for the Mars Direct Mission with a crew of 4 is shown as Table 4.4

Item	Need/ man-day kg	Wasted/ man-day kg	Fraction recycled	Requirements in kg		Hab 600 days on surface	Hab Total kg
				ERV 200 days to Mars	Hab 200 days to Earth		
Oxygen	1.0	0.2	0.8	160	160	0	160
Dry food	0.5	0.5	0	400	400	1200	1600
Whole food	1.0	1.0	0	800	800	2400	3200
Potable Water	4.0	0	0.8	0	0	0	0
Wash water	26.0	2.6	0.9	2080	2080	0	2080
Total	32.5	4.3	0.87	3440	3440	3600	7040

NASA Politics

Everything about the Mars Direct mission plan looked good, but politics has a lot to do with NASA decisions. The vice president of Martin Marietta Civil Space presented the Mars Direct plan on April 20, 1990, to NASA at the Marshall Space Flight Centre in Huntsville, Alabama, and it was well received by those present. However, after publication of the plan in the media, and Aerospace America, the industry monthly, other NASA sites became more hostile.

The President Bush administration tried to find a new architecture for the Space

Exploration Initiative to replace the failed 90 Day Report, and set up the "Synthesis Group", chaired by former Apollo astronaut General Thomas Stafford. They listened to the Mars Direct plan, but, in their report, issued in May, 1991, they opted for a slightly updated version of Werner von Braun's nuclear propulsion mega-spacecraft plan of 1969. After this was published, Robert Zubrin was able to convince Mike Griffin, one of the "Synthesis Group" and Associate Administrator for Exploration within NASA, of the merits of Mars Direct.

Griffin liked it, and briefed Dan Coldin, the incoming NASA chief administrator,

who also became a supporter. This led to a NASA revision of the plan, and modifications to a "Mars Indirect" plan, with three launches per mission. One would deliver a self fueling Mars ascent vehicle to the surface, together with a lot of equipment and supplies. Another would deliver an Earth return crew cabin, together with a methane/oxygen chemical propulsion stage to a high orbit about Mars, and the third would deliver a hab with the crew to the Martian surface. With this arrangement, only as much propellant would be produced on the surface as needed to send the Mars ascent vehicle from the

surface to rendezvous with the crew cabin in orbit .

In 1993 NASA undertook an elaborate design study of the Mars Semi-Direct plan. This was costed by the JSC costing group that developed the \$450 billion estimate for the 90 Day Report, and arrived at a cost of \$55 billion. They had scaled up Mars Direct by a factor of 2 in coming to the Mars Indirect option, so the Mars Direct option would likely cost about \$30 billion - about the same amount that the US government gave to Mexico in one afternoon in the summer of 1995.

Renewed Interest in Mars

On August 6, 1996, NASA administrator, Dan Goldin released a statement of the startling discovery that might point to microscopic life on Mars, from work done on a Mars meteorite ALH84001, found in Antarctica. In November 1996, additional evidence was found, this time strong evidence of biogenic gases in another SNC meteorite, EETA79001 by British investigators. This meteorite was less than 200 million years old, so there is a chance that life still exists, or had died out after dinosaurs died out on Earth, and thus may have left traces that only manned missions might find and evaluate.

The climate in US politics is changing in the light of such hints of microscopic life on Mars, so there is a possibility that there may yet be a manned visit to Mars in our

lifetime. If they do go, then I am sure that "The Case for Mars" would in some form or another, find its way aboard as a bible of how to explore and eventually settle Mars.

John Casey ■

Borrowing MacDob

The Society's own telescope, a 6" Dobsonian, is available for loan to members. It is easy to transport, set up and use. If you would like to borrow MacDob for a month, speak to Phil Ainsworth who is its custodian. Though there is no hiring fee, members are invited to make a donation of their choice which will go towards the upkeep and upgrade of MacDob

Official Field Nights

(Key: Farm = Oakdale Farm
Air = The Old Airfield)

21/10 - Air; 28/10 - Farm
18/11 - Air; 25/11 - Farm
16/12 - Air; 23/12 - Farm
30/12 - Air.

Where the author of a Prime Focus article is not indicated, the author is the Editor.

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Cool Website

If you search Altavista for 'Hubble Space Telescope' you will find an absolutely fantastic website celebrating HST's 10th Anniversary. It contains mega-oodles images going back from the latest to HST's beginning and stacks of technical data about the HST. It's a long name:
http://pao.gsfc.nasa.gov/gsfc/spacesci/hst10/hst_main.htm

**What's To See This
Month: 16th Oct to 19th Nov.**

FEEDBACK PLEASE: I am looking for feedback from our members as to whether this monthly article adds any value to your astronomical experience. I am aware that our 'experienced' members will find nothing new in it that they haven't already gleaned from *Redshift*, *StarryNight*, *Astronomy 2000* and a simple Star Wheel etc. I have hoped that our newer members might find it helpful as a quick start to observing each month. If not, is it worth continuing? I would appreciate your honest opinions at this or the November meeting. Bob

Planets are coming back into viewing now, which is good news for the Observatory volunteers who haven't been able to poke a stick at a planet since opening.

Mercury is mostly lost from sight as it passes close to the Sun.

Venus, on the other hand, is setting later and later, giving a marvellous bright show at mag. -4 (stay tuned for all those UFO sightings Phil.) For this month, Venus is passing through Scorpius, Ophiuchus and then Sagittarius, creating many close encounters with stars and clusters. Some of these are:

21/10 – 1° of δ Scorpii
24/10 – 0.3° of M80 (a glob)
27/10 – 3° of Antares

30/10 – Antares, Venus, 1 day old Moon form a nice triangle with Antares and Moon forming the 12° base.

2/11 – 1.8° from M19 (a glob)

13&14/11 – 1.3° from M8

17/11 – 0.7° from M28 (glob)

And looking into the next month, on 20/11, Venus will be 1.6° from M22.

Mars: You have to get up just before morning twilight to see Mars rise about 2 hours before the Sun. Go, you early birds.

Jupiter viewing is becoming realistic. For this month, its rising time progresses from 11pm to 8.30pm (daylight saving time.) It will be visible at a glorious mag -2.9, and is a mere 630 million km away, approaching opposition on 28th November. For the whole month, Jupiter will be in the neighbourhood of Taurus, about 5° from the red giant Aladabaran.

There is a nice arrangement on 16th Oct (midnight tonight – after the MAS meeting) when the near full moon is smack between Jupiter and Saturn.

For those into trapezoids, there will be a nice one on the 17th Oct. (also about midnight) when Aldabaran, Jupiter, Saturn and the Moon get geometric, with the Moon and Saturn on the long axis.

Saturn, of course, rises before Jupiter, its rise times progressing from 9.45pm to 7.30pm. So it should be good viewing for all. Saturn's

opposition is on 19th Nov. and it will be 1,200 million km away. The rings will be in an ideal aspect for viewing, having an overall diameter of 46 arcseconds, almost as large as Jupiter's apparent disc size. As an extra treat, the full moon will be just 1.2° from Saturn on 12th November.

Uranus & Neptune are still viewable in Capricornus and as they set at midnight, are still in a convenient time and location for observation.

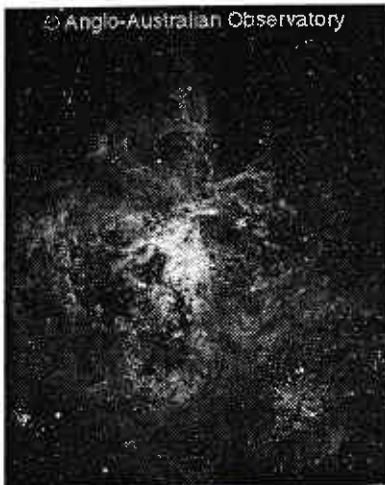
Constellations:

It's getting close to 'adios' time for the magnificent Scorpius and Sagittarius as they head over the western horizon earlier each night. Take this last opportunity to study the numerous objects in these glorious areas of the sky. You won't see them again till April next year.

Andromeda: If you can get to a site with a clear northern horizon and minimum light glow, now" your chance to view M31, the superb Andromeda Galaxy. Even with binoculars from the Oakdale Farm, I could see the white glow of the central galactic core (it looked like a large elongated globular.) It is very low on the horizon, but it is there.

LMC & SMC: The two Magellanic Clouds are nice and high in the south, ideal for viewing. The Tarantula Nebula, an appendage of the Large Magellanic Cloud, 170,000 light years away, is a real treat, even in binoculars,

while 47 Tucanae is a magnificent globular cluster, the 2nd best, very close to the Small Magellanic Cloud.



Tarantula Nebula
(Photo by D Malin - AAT
Used with permission)

Sculptor, tucked south of Cetus and Aquarius, has three nice galaxies at mags 7, 8 & 9. The most famous, **NGC253** is a 7th mag spiral seen nearly edge-on. At an estimated 9 million l.y. it can be just spotted in binoculars, but amateur telescopes of 100mm+ should have no trouble. It is at 0h 48m, -25° which is close to 7° south of the 2nd mag star β Ceti.



NGC253 in Sculptor

NGC55, at mag 8, is also edge-on but night as bright as NGC252. At 0h 15m, -39°, it is about 3° north of the mag 2.4 star α Pheoniceis.

Also, **NGC300** is a 9th mag galaxy. This is basically face on and has a loose spiral structure. At 0h 55m, -37.6°, it is approx. 10° east of NGC55.



NGC300 in Sculptor

Pisces is above (i.e. to the south) of Andromeda and Pegasus, higher above the horizon. Unfortunately the constellation is fairly faint with its main stars mag 3.8 and fainter. But it has a number of binocular and telescope doubles, such as α (splittable with 100mm+); κ a mag 4.9 with a binocular 6th mag companion; ρ a white mag 5.4 with an orange giant mag 5.5 splittable by binoculars; ψ^1 is a test for binoculars but a sure thing for small scopes – a true binary of 5th mag whites;

Then to top it off, Pisces has **M74**, one of the finest face on galaxies a mere 25 million light years away.

However, be warned. Burnham describes 11th mag M74 as “one of the faintest and most elusive of the Messier objects” and definitely “requires a clear dark sky and a suitable low power eyepiece.” I wonder if our intrepid Messier Hunters in MAS would agree with this description. To quote Burnham again: “Under the best conditions, it may appear as a circular, quite featureless glow, about 6' in diameter (that's 1/5th a Moon diameter) with averted vision, and with a bright, nearly stellar nucleus.”



M74 in Pisces

November Prime Focus

The next issue will be the last for 2000. I'd like to see it become a Super-Bumper issue. I already have some articles but I'm looking for more.

So this is your chance to see your name in print. Please get them to me – preferably typed up in a floppy in Word or WordPerfect – no later than 10th November. I can scan photos for return to you.