# MACARTHUR ASTRONOMICAL SOCIETY Inc.

Journal



# **PRIME FOCUS**

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# **President's Report**

#### For Tonight

Welcome to all members and guests. Tonight is our Annual General Meeting and as such we need to table reports and hold elections for new management and committee positions. It's been a busy year for us even when taking into account the poor weather experienced from time to time.

I have a separate report to file on our activities since the last AGM and you will find that report elsewhere in this journal.

Afterwards we will open our monthly meeting and I believe after announcements we will have a video to show tonight.

#### A Rather Grey Night

Well, here I sit on a certain Friday afternoon, the date is March 18 and the time is 6.30pm. Our first open public night for this year is cancelled due to a heavy blanket of dark grey clouds. Ragbir called me to say, "Noel, it doesn't look good". We might have to cancel.

Well, it doesn't take a rocket scientist to work out that using telescopes to view the heavens is so totally dependant on the weather and it is so totalling frustration when things do not go according to the grand plan.

Too bad about this night though. We had some good publicity around it and with clear skies I am sure we would have had some eager stargazers come up to the dome.

Ragbir and I made ourselves available for any members of the public who managed to wander up. Yes, several people did come up but we closed up shop at 8.30pm. My thanks to all the members who would have made themselves available for the night, better luck next time round.

#### A Rather Clear Night

It was clear skies that met us for the forest night held March 12. We had a great turn out of members and it was great to view the fantastic skies that only the forest can bring. The kids had a ball and I was fortunate enough to stay into late Sunday morning and enjoy that famous breakfast that only Lloyd can cook.

I turned in early on the night but I know that many members were eagerly awaiting Jupiter's great red spot to make an appearance. Indeed the views of Saturn and Jupiter were very good.

You don't need to have a telescope as anyone on the field is willing to share the views, we are very social. So if you're a member why not come on down next time. A small hire fee is in place for those staying overnight

#### Many thanks

I thought I would quickly thank those members who made the Wollongong Catholic Diocese teachers star night such a success down at Bowral. To John, Dick, Lloyd and Ian - great work.

Bob Bee wrote a great article in *Heavens Above!* to help us with the Observatory night. Also, Bob has been doing the Mount Annan Botanical Gardens dinner and stargazing on a Friday night - great work.

Some great articles have been appearing recently in our journal courtesy John Casey and Frank Kish. These in depth articles read very well. This compliments the overall tone of Prime Focus and I thank these two fine writers. To John and Frank - please keep them coming.

#### On The Radar

The Magellan Observatory visit is still on the cards, hopefully I will have some news soon. Also at time of writing we are organising the Sports Ground open night at The Oaks. One of our members Bernard Kornfeld has indicated he would like to be our speaker for an upcoming meeting. That's fantastic!

As mentioned last month we wish to purchase a digital projector. We have received positive comments, further details are in the minutes of the committee meeting held the other week. The minutes are next to the attendance book. We are hopefully looking to make a purchase by the end of this month.

#### Lots of Freds

I have received a ton of input around obtaining guest speakers for our society. It's still a work in progress, however I have spoken recently to Fred Watson from the Anglo Australian Observatory at Siding Springs. We had a lengthy chat and he would be very pleased to talk to us later this year. He has asked if I would contact him say late June to organise a date.

Fred made an appearance on the Today Show recently while I was holidaying down at Sussex Inlet. They crossed to him during the weather segment. My wife yelled out at me "Noel something about astronomy on TV", I raced downstairs and caught him just in time. When you guys were having your meeting last month I managed to get a very old HMV valve radio working and caught Fred's weekly ABC radio interview. The crackle, fading out and constant re tuning of the radio made for a very entertaining night, especially combined with a cold beer. Maybe it was me fading out and not the radio!

By some strange cosmic circumstances Fed Watson was doing a lecture down at Oxley College at Bowral the week after our guys were at Bowral doing the Star night with the reverend Chris Toohey. Life does move in strange circles.

# ACTIVITIES

30/04/05	The Oaks
07/05/05	The Forest
14/05/05	Possible Public Night, Dudley
Chesham	Sports ground.
16/05/05	Monthly Meeting
04/06/05	The Forest or Magellan
10/06/05	Campbelltown Rotary Observatory
11/06/05	The Oaks
20/06/05	Monthly Meeting

As always please be aware that changes can happen so please check in with John Rombi or myself on 0410 445 041. This is a really diverse agenda for us and it's great to have a variety of activities. Let's hope for clear skies and no cancellations.

Please renew your membership if not already done so - fees were due as at 28<sup>th</sup> February. We normally hold over till about the end of this month before deeming anyone as unfinancial. Remember that if you joined the society from October last year onwards then you are off the hook, your fees will renew next year.

#### Late Breaking News

I can now confirm that our guest speaker for next month will be Zane Hammond. Zane paid us a visit a while back and is very pleased to be invited again. Zane runs the Magellan Observatory. We have pencilled in a visit to the observatory for the weekend of the 4<sup>th</sup> of June. There is a lot of interest shown by overseas visitors and there is a return visit by another society so dates are filling fast, hence the June date.

There is an accommodation fee involved, however it is reasonable if we take into account how many members might go down. There is also a possibility of hiring the JMI 18 inch NGT telescope for our exclusive use. It comes with digital setting circles and a bagful of Nagler eyepieces.

As a guide, if we get say 10 members to stay then the fee would be \$24.50 each, that's for 2 nights. The hire for the 18 inch is \$60.00, that's \$6.00 each. The scope is on an equatorial mount. That's a big scope and should give some unbelievable views of Saturn and Jupiter.

Zane's talk next month will be on digital astrophotography, Zane is an amazing photographer and is putting together a power point presentation especially for us. If all goes well we might be able to use our new projector.

With John Rombi's assistance we are trying to arrange a visit by Rev Chris Toohey. ABC television personality Geraldine Doogue will be doing an upcoming Compass series on him. Rev Toohey is a theologian, respected scientist and exceptional planetary observer.

Zane told me that his extensive collection of Nagler eyepieces would pale in comparison to that of Chris Toohey's. Gee, makes my collection of eyepieces seem a tad feeble.

Want to know more!

Go to <u>www.goulburn.net.au/-magellan</u>, for details about Zane's observatory. Also in Sky and Space magazine see Chris Toohey's review of the Orion apochromatic refractor. That's in the Nov/Dec 2004 issue. I'll bring a copy in my bag tonight.

Well that's all from me. Let's hope that the cool dark skies of autumn can bring some great stargazing.

Noel Sharpe President

# Vice President's Report

With Noel's absence from last months meeting due to a very needed and earned holiday, I was thrust into the position of running the show.

We decided in the absence of a guest speaker to run a series of casual conversations, they were in no particular order, What I've learnt from the Internet, Computing in Astronomy, and Astrophotography.

Ian, Bruce and Daniel facilitated each group. Each person came with a different level of expertise, and with the usual M.A.S. friendliness, help was at hand to solve problems in the area of interest.

Due the great success of the night we hope to be able to hold nights like these a couple of times a year.

John Rombi

# **President's AGM Report**

This report gives us the opportunity to reflect and make comments on the various activities of the Society from one AGM to the next, basically covering 12 months.

It's been a year of mixed observing for most of us due to the poor weather. We have had some excellent speakers and some exciting events.

My thoughts before writing this report were around the cancellations and reschedules courtesy of the weather. When I look back in some detail I was amazed as to what has been accomplished by the Society over the 12 month period.

Of course the Society can only operate successfully by the time and expertise given to it by many members. To everyone who has contributed in any way to our success please accept my sincere appreciations.

#### Speakers

April 2004: Ian Cook presenter - The Herschel family, discovery of Uranus and construction of large Telescopes.

May 2004: Bob Bee presenter - White Dwarfs, the star Sirius and the Pup.

June 2004: Dr John O'Byrne, senior lecturer School of Physics Sydney University

- Adaptive Optics and the Near Infra Red Spectrograph instrument.

July 2004: Dick Everett presenter - Cassini Space Probe.

August 2004: Ned Pastor presenter -Tektites, Meteorites and the Maldavites.

September 2004: Dr Stuart Ryder, Astronomer Anglo-Australian Observatory -Supernova and Gamma Ray Bursts.

October 2004: Michael West, Mars Society - Rocket Propulsion Systems.

November 2004: Video on exploration of Mercury and Venus

January 2005: News from Cassini and Huygens probe, other updates Dick Everett. Also a quiz on astronomy was held by lan Cook.

February 2005: Peter Elston Presenter -Solar Eclipse Chasers, flight over Antarctica,.

March 2005: Various conversation groups.

As you can see it's been a great year for speakers with a wide variety of topics covered. It's always great to get professional astronomers and lecturers to visit us. All comments that I have received indicate how well our Society is received in the wider astronomical community. It's equally important to also seek the engagement of our own members to act as speakers when the opportunity arises. I certainly extend the appreciations of everyone in saying, well done!

#### **Events and Activities**

22/05/04 Dudley Chesham sportsground at The Oaks, major public night.23/05/04 Same as above, another public night to view two comets.

**08/06/04** Macarthur Anglican High School, Transit of Venus and star night.

24/07/04 Lunar night at the Sports Ground. 07/08/04 International Students star party, The Forest.

**28/08/04** Guides Australia, a night under the stars.

**21/09/04** St Mary's Catholic School Eaglevale star night.

**15/10/04** Campbelltown Rotary Observatory.

23/10/04 Public night at the Sports Ground. 19/11/05 Campbelltown Rotary

Observatory.

05/12/04 MAS Christmas Party.

15/03/04 Wollongong Diocese Teachers Retreat, Bowral - Star night and lecture by Rev Chris Toohey.

#### Special Mentions.

The transit of Venus was a fantastic event, Daniel Ross held a viewing at the Macquarie Boys Technical college where he is a teacher, Ian Cook set up his scope near his house for all to grab a view and Bob Bee assisted his work colleagues in gaining a glimpse of the transit through binoculars.

At other times during the year other members have made contributions. Bruce Reardon held a viewing night for his son's cub group and John Koster gave discussions on astronomy to the Probus club. Also Bob Bee continued with the successful Mount Annan Botanical Gardens dinner and star nights.

Also Bob Bee has a regular column in the Chronicle newspaper, *Heavens Above!* This is a strong linkage to the overall community. To everyone please accept my appreciations, I do apologise in advance if I have missed anyone.

# Other Things

We have attended many field nights at the Oaks and the Forest. These two venues form the basis of our observing activities, we also were able to get our web site up and running.

Yours sincerely

Noel Sharpe

# Internet News About Titan

Here's a grab-bag of items off the internet following the successful Huygens probe landing:

# Switzerland's news and information platform:

14.1.05, 1.45am. Space probe nears Titan encounter - Los Angeles (Reuters). One of the most ambitious space missions in history nears its climax today when a European built space probe lands on Saturn's largest moon Titan and sends back the first look at its fog shrouded surface.

Titan, believed to be the only moon in our solar system with an atmosphere, is larger than the planets Mercury and Pluto.

#### B.B.C News U.K. Edition

**25.1.05.** Search for life signal on Titan, scientists will comb data sent back from Titan by the Huygens probe for the chemical signature of life in a bid to identify the moon's source of methane.

Dr Francois Raulin, University of Paris said: "We cannot say there is absolutely no chance of life, we have liquid water, organics not far away, we have everything on Titan to make life."

#### C.N.N. COM.19.1.05

Los Angeles, California (Reuters). Scientists said today:

Titan has a crème brule like surface: data sent back by Huygens space probe from the Saturnian moon Titan show a frozen orange world shrouded in a methane rich haze with dark ice rocks doting a riverbed like surface, the consistency of wet sand.

#### 14.1.05 AIJAZEERA.NET

Titan probe beams back breathtaking photos. The world has had its first look at the surface of the Saturnian moon Titan with European space probe Huygens beginning to send back breathtaking images.

#### **Other Internet News**

The Boston Globe has reported that astronomers have figured out a way to measure the universe using a kind of cosmological ruler.

Finding the cosmic ruler required two teams of scientists to map more than 260,000 galaxies. They conclude that the universe is flat with ripples. The ripples are left over from the big bang about 15 billion years ago. "The infant universe was naturally making a sound and those waves produced the ripples," said Daniel Einstein an astronomer at the University of Arizona. The way galaxies are scattered across the sky now corresponds to sound waves in the early time of the cosmos. The sounds of the microwave background (left over from the big bang) turned into galaxies and cluster of galaxies that we see around us. [I'm not sure what they mean about 'sound' of the microwave background etc. Might have to look deeper into that. Ed.1

# Egg Shaped Regulus Spins Rapidly

There is a report in Astronomy Online 21.1.05 that Regulus in the constellation of Leo has a shape similar to an egg. Its equator spins at 1.120,000 kph whilst our Sun spins at 7,200 kph. That is very fast and our Sun is slow compared to those figures. Regulus is also five times the diameter of our Sun. Its equator is one third larger than its polar region. Ursula Braatz

# Lunar Transient Phenomena or Colour in the Moon

One of the highlights of my observations of the Moon in 2004 was the crater Aristarcus. On the night of 27th August the night sky's transparency was so good that it made features on the Moon extremely sharp. From 10pm onwards Aristarcus was ablaze with colour, the higher the moon travelled toward the meridian the more intense the colours became.

So enlarged for your convenience is the crater Aristarcus. You need colour pencils to get an idea of the conditions (see Ned if you don't have any).

B is the crater terminator shadow Apparently the colours are a result of prismatic distortion - refraction - of the moonlight as it passes through Earth's atmosphere, a plausible but dull explanation. The best coloured in crater will win a prize. (See Ned for this also.)



著 Bands B = Crater Terminator Shadow

#### Colour Code

A: Blood Maroon	B: Black
C: Electric Blue	D: Ruby Red

#### Ned Pastor.

# For Sale

A) Used 8" F/4 Newtonian on solid German Equatorial mount & tripod. Selection of evepieces. \$650 ONO.

B) New (still in box) Meade 8" F/4 SN LXD75AT W/UHTC with Meade LXD75 Mount/Tripod/AT. Includes training from Bintel.

\$2000.

Call Bernard Kornfeld (0414795554)



Q1: What well known cluster is this?

Clue... it is an IC object. Answer on p16

### A Brief Analysis of Matter (Part 5) By Frank Kish

This is the 5<sup>th</sup> installment of Frank's epic article.

#### 4) ORIGIN OF MATTER BY CHANCE

If the origin of the *finite Universe* was not caused by a *Prime Cause* outside itself, then the Universe is either not *finite* or it was caused by *Chance*.

Chance, however, can never be a *Cause*, as it is a *circumstance*, meaning that the Effect it produces has a nature of *unpredictability*. If *creation/Big Bang*, *etc.* is a "*chance-effect*", and while knowing that Cause cannot be *unpredictable*, one may ask: What was the Cause of all these *Effects* in the physical reality, and ultimately, what was the *Prime Cause* of the Universe? In the absence of scientific evidence for or

against *chance-origin* of matter, the problems associated with it are highlighted in the following quotations:

**R. Naeye:** Astronomy, July, 1966: "On Earth a long sequence of improbable events transpired in just the right way to bring forth life, as if we had won a million dollar lottery a million times in a row."

P. Davies: Are We Alone?: "Human intelligence can be explained as the result of three possibilities:

(i) Stupendously unlikely accident.
(ii) Self-organizing cosmic principle that brings about consciousness as a cosmic imperative.
(See the cosmic constants and the genetic code, but who is the organizer?).
(iii) Supernatural miracle." **C. Sagan:** "A single message would establish the existence of E.T. Intelligence." A philosopher's comment: "The signal, a clear mark of intelligence, was left on this planet cca. 3.85 billion years ago, in the form of the *Genetic Code*. This message resides in every biological cell of every existing being." (But who is the messenger?)

**S.Weinberg:** "Life as we know it would be impossible if any one of several physical quantities had slightly *different values*. The best known of these quantities is the energy of one of the excited states of the carbon 12 nucleus. There is an essential step in the chain of nuclear reactions that build up heavy elements in stars."

Freeman Dyson: About the so called *lucky* accidents in the atomic structures: "Without such accidents, water could not exist as liquid, chains of carbon atoms could not form complex organic molecules, and hydrogen atoms could not form breakable bridges between molecules."

S. Hawking: "If electric charge of the electron had been only *slightly different*, stars either would have been unable to burn hydrogen and helium or else they would not have exploded, and the heavier elements necessary for *life* would not have been available."

**R. Penrose:** "The odd against the observable Universe appearing by *accident* is shown by a figure of my estimate as 10<sup>10^30</sup>, to *one.*"

**P. Davies:** "If the strength of gravitational force were *altered* by a mere one part in 10<sup>40</sup>, stars like our *Sun* would not exist, nor, one might argue, would any form of *life* that depends on solar-type stars for sustenance."

**S. Hawking:** "The *odds* against a Universe like ours emerging out of something like the Big Bang are *enormous*...I think clearly there are *metaphysical* implications whenever you start to discuss the *origin* of the Universe. But I think most scientists prefer to shy away from the religious aspect of it."

**S. Hawking:** "Even if there would be only one possible *unified theory*, it is just a set of rules and equations. What *is* that breathes *fire* into the equations and makes a Universe for them to describe? The usual approach of science of constructing a mathematical model cannot answer the question of *why* there should be a Universe for the model to describe.

**S. Hawking:** "Physicists see the logical necessity for something more than a set of physical laws at the *beginning*."

H. Pagels: "Where are these laws of nature written into the *void* (space) before the beginning? What tells the *void* that it is *empowered* and *ready* for the beginning of a possible Universe? It would seem that even the *void* is subject to *law*, logic, (*"Logos"*), that exists prior to *space* and *time."* 

#### 5) EVOLUTION AND PROPERTIES OF MATTER

#### 5.1 Evolution of Matter

The evolution of matter in our Universe can be traced backward in time to the Big Bang, which according to the present scientific theory started in an explosive way from a *singularity*, where all the matter of the Universe was concentrated "at a point" and where space and time began. Why did the Big Bang take place and why was it the way it was? The chain of regressive causal process from state to an earlier state asserted as a *sufficient cause*, where scientific speculation came to a halt with the initial Big Bang. At this point physics and cosmology seem to become inextricably entangled with questions of more philosophical nature in our search for answers, which science cannot provide.

The evolution of matter went through in microseconds several transformations from the initial brief flash of Big Bang, until it reached the formation of galaxies. The primeval nucleosynthesis produced cca. 75% by weight of hydrogen and 25% of helium. The steady rate of cooling due to the rapid expansion of the early Universe ensured that from the original mixture of hydrogen/helium nuclei and photon radiation a wide variety of heavier elements would form.

The Universe is made of *energy* and *matter*. We still don't know what 99% of the cosmic mass is made of. Some refer to it as the 'missing mass", others say it is the "missing light", hence it is safe to settle to call it "dark matter".

The *physical structure* of the Universe comprises the Forces of Nature and Particles out of which *matter* evolved. Finally, matter separated from light radiation then *proto-galaxies* were formed. Galaxies formed super clusters whose dimensions can extend 500 million light years. These clusters move with velocities of hundreds of km/sec. due to the expansion of space.

Due to gravitational forces within the galaxies, slow contraction formed gaseous globules. After a balance reached between the external gravitational forces and the internal heat energy build-up, these gaseous globules compressed sufficiently to set off thermonuclear fusion reaction within their core. Thus, the *stars* were born.

Stars in galaxies form a dynamical unit. Atoms which formed in many different stars of our Galaxy, travelled across inter-stellar space and through billions of years, developed into a giant gas cloud that finally became our *Solar System*.

Thus, every single atom on Earth, and in our bodies, came from our Milky Way Galaxy. Our Solar system is located in the *Orion Arm* of the Galaxy, cca 2/3<sup>rd</sup> from its center, on the 75° to the South Celestial Pole, 330 I.y. from Theta Apodis.

All the stars that we can see are located in our Galaxy. The Earth during its annual orbit around the Sun mostly faces *away* from the Galaxy in winter nights and facing *towards* the Galaxy in summer. This is the reason why we don't see so many stars in the winter-sky.

Just for curiosity, let us visualize the unimaginable, comparative scale of the material world by imagining for our reference point, the size of the Milky Way not bigger than an aspirin. From our Galaxy the edge of the Observable Universe is 1km, away. The size of another aspirin, M31, the Andromeda galaxy is 13 cm. away; Andromeda and our Galaxy are being 2 of the 35 galaxies of the Local Group. The 200 galaxies in the Virgo Cluster having the size of a basket ball, are 3 meters away. The Sculptor Group (similar to the Local Group), is 60cm. away. All these above are comprise the Local Super Cluster. Furthermore, thousands of galaxies in the Coma Cluster are 20 meter away. Cygnus A galaxy, (20 m. across), is 45 meter away. The brightest Quasar-3C273 is 130 meter away.

#### The Importance of the Supernovae.

In their dying phase, stars heavier than our Sun, the nuclear reaction stopped and their core becomes a solid mass of iron, the star shrinks in its original size to a proportion of Sun/Mt.Everest. Material from the inner region begins to fall towards the core creating high pressure and temperature, causing the dying star to explode.

During this expansion neutrinos and elements heavier than iron form in the core, expelled by the shock-wave from our Galaxy towards other galaxies and towards Earth. The remnant of the star is called *pulsar* or spinning neutron star.

#### 5.2 Properties of Matter

The structure of matter is atomic, i.e. all matter is made of atoms, which originate from our Galaxy. If we look at a pile of wheat from a distance, it appears to be a *continuous*, smooth mound. In close up we realize the illusion as we see that mound in fact is made up tiny grains. These *discrete* grains are the Modern Physic's "*quanta*" of the pile of wheat.

Planck tried to understand the material radiation of a *black body* through analyzing the color-spectrum of a heated object. He came to the conclusion that heat radiation was *vibrating oscillators*, whose radiant-energy exchange with the *black body* was *quantized*.

The oscillators were none other than atoms, of which the black body is made. The energy exchange is not continuous but discrete. The amount of discreteness is specified by a "number" **h**, called the Planck's constant. This was the beginning of quantum theory of Modern Physics. It follows from this theory that if *h* could be set to zero, the size and the "continuous" nature of the grain pile, as well as the Universe, would *reappear*.

a) The Atom has a number, the *atomic* number, which is simply the number of protons in its nucleus. The *atomic* weight is given in most cases by the mass number of the atom, which is the combined total number of protons and neutrons. An atom is symbolized by its chemical symbol having an *atomic* number<sub>xxx</sub> (a subscript), and mass number<sup>yyy</sup> (superscript). For a neutral atom, the number of electrons is equal to the atomic number.

The tiny positively charged core the nucleus. is only one ten thousands the size of atom. Almost all of the mass of the atom, and hence of ordinary matter, is concentrated in its nucleus. The much lighter, negatively charged electrons orbit around the nucleus much like the planets orbit the Sun. This picture, however, is an analogue only, because of the quantum theory, these electrons should be viewed as smeared out over their entire orbit so that they form a cloud charge of uncertain and complex shapes. Surprisingly, the sizes of all atoms are comparable; despite the large differences in the number of electrons they contain. The properties of electrons determine the laws of chemical combinations for the formation of molecules.

(i) **The Nucleus** of an atom comprises two "massive" (composite) particles: *protons* and *neutrons*.

(ii) The Electrons form the outer part of an atom; they are "light" particles.

(iii) Mass of an atom is measured by its rest energy, and in terms of a unit of electronVolt. The mass of a *neutron* is cca. 1 GeV. The mass of a *proton* is cca. 1 GeV. - " - *electron neutrino* <20 eV. - " - *electron* 0.5x10<sup>6</sup> eV.

Einstein applied the Law of Conservation of energy to mass as well, as energy and mass are simply manifestations of the same thing. Today energy/matter only appear distinct, but at the Big bang and in the ultimate end matter may again freely converting into energy. Matter and the Universe didn't exist for all times, this has been proven by the microwave-background radiation, as if in this case the "black body" would be the entire Universe.

b) The Molecules are the smallest physical quantity of matter; they create everything we can see, feel, smell, hear and measure in the reality. If a molecule is divided, it looses its chemical properties, and it is not the same any longer. Atoms in molecules can form solid matter, gas or liquid. *Random* chemical interactions cannot explain the myriad of complex molecules in the Universe, or the existence of life on Earth.

Molecules range in size and complexity from a few atoms, (like water), to tens of thousands of atoms in large organic molecules. Water e.g. is known to posses at least *eight* different crystalline states, which are observable at very high temperatures. At low pressures and temperatures, such as in interplanetary and interstellar space, water turns into amorphous solids, with their aggregate crystals take on *powdery* or other nondescript shape. Other crystals, like diamond form a continuous network of chemical bonds; diamond is, in effect, one single molecule.

(To be continued...) Frank Kish ■

#### Footnote re Frank's article:

[For those with a bent for big numbers, you may be interested in how big that number Frank mentions in R Penrose's quotation about the odds of an observable universe appearing by accident -  $10^{10^{+30}}$  to 1. That is, 10 to the **power of 10^{30}**. That's 1 with **10**<sup>30</sup> **zeroes after it**. That's 1 with a thousand billion billion billion zeroes after it. That's...BIG! Ed.]

# **Recognition Quiz**

This page has some 'well known' deep sky objects. Can you identify them? Answers are on page 16. (Object 1 is on page 7.)





Prime Focus Vol 10 Issue 3 April 2005









# Wot IC This Month 18 April – 15 May, 2005

# Overhead at 8.30 pm

South - Canopus rides high overhead, Puppis will make your neck ache, then Regor, the False Cross, Alpha Crux, Pointers in Centaurus with his spear stabbed into Lupus and the head of Scorpius rising from the east.

North - Orion hastens away from Scorpius to the west, Sirius blazes down directly overhead, with Procyon, Castor, Pollux, the Sickle of Leo with Regulus in procession to the north and Jupiter ahead of white Spica. Libra and Arcturus appear later from the northeast

# The Moon Diary

24/04 Full Moon; 01/05 Last Quarter 08/05 New Moon; 16/05 First Quarter

# **Evening Sky Planets**

Venus has been hidden since March but now returns to the evening sky in the twilight glow of the setting Sun. Rising higher each successive night for a couple of weeks before plunging to meet the Sun once more.

Jupiter remains in Virgo rising between 5-3 pm in the daylight and setting before the Sun comes up next morning. Past opposition but still large and bright Jupiter rewards careful observation of its bands and zones through light coloured filters. On 22<sup>nd</sup> April and 19<sup>th</sup> May the Moon will pass less than 1° above the planet. Saturn rises in Gemini round half past midday, to just after 11 am this month. Lying low in the northwest it sets between 11 and 9 pm by the time of our next meeting. On the 13<sup>th</sup> May the crescent moon will lie above the planet.



Neptune is still in Capricornus rising round midnight and visible till morning. It will soon begin a traverse back to the east towards Aquarius for a few months.

# Morning Sky

**Mars** rises in Capricornus round 1 am setting during daylight the next day. At the end of April it will move into Aquarius and on 3<sup>rd</sup> May the Moon will pair up with the red planet before Mars moves to join up with Uranus on the 16<sup>th</sup> May in the vicinity of the Helix Nebula.

Uranus spends a quiet month in Aquarius receiving a visit from the moon on 4<sup>th</sup> May.

**Mercury** rises two hours ahead of the Sun from mid April to mid May giving the best morning views of the hot planet this year. It will have some interesting dances with the crescent Moon on 6-7<sup>th</sup> May.

#### 14

#### Comets

A number of comets (Astronomy 2005) are becoming visible for larger scopes but the best are still Linear T4 in Sculptor, Fornax, Eridanus and Caelum at 7-8<sup>th</sup> mag. and 9P Tempel which will be 10<sup>th</sup> mag 1° from Epsilon Virginis.

#### Portraits in The Sky

# LUPUS –

#### "The Spitted Wolf"

Lupus is located between the Pointers in Centaurus and the Claws of Scorpius in the north east with Norma to the east. Although small it is packed with interesting items, especially double stars, due to its position in the Milky Way

The constellation refers to King Lycaon who ruled Arcadia with his fifty sons. Called 'Lightning Wolf' he was a cruel ruler who continued human sacrifice long after other parts of Greece had abolished it as barbaric.

One day Zeus (or Jupiter if you're Roman) visited Arcadia disguised as a simple traveller. Lycaon offered him soup with the meat of goats and sheep, but included some juicy parts of his own son Nyctimus. Zeus leaped to his feet overthrowing the table in angry disgust. With a click of his fingers Nyctimus was re-assembled and brought back to life, while Zeus proceeded to barbecue Lycaon and all his fifty sons with lightning bolts. Hence the 'wolf or beast', impaled on the spear. Maybe it's a roasting spit?

Even before the Greeks put their story on it, the constellation represented a sacrificial animal of some sort. The shape is not obvious, and difficult to differentiate from Centaurus, its closest neighbour, but the 'beast' seems to be carried on the spear of the Centaur.

It is probably best to start at the spear of Centaurus which are all 2<sup>nd</sup> magnitude stars about 15° nor-east of  $\omega$  Centauri and star hop to  $\kappa$  Centauri. In the same field to the south is  $\beta$  Lupi, which at 2.7 magnitude is slightly brighter than  $\kappa$  Cent, and down to the southwest 5° you'll find  $\alpha$  Lupi.



Alpha Lupi called Kakkab meaning "The Star Left of The Horned Bull" ?? (What the...) is the brightest star of the constellation at 2.3 magnitude. The horned bull is Centaurus. Kakkab is a hot B class giant 10 times larger than our Sun. It has an unequal multiple pulse. Size-wise it is just on the dividing line between those stars that will blow up and

Prime Focus Vol 10 Issue 3 April 2005

those that will collapse into massive white dwarfs.

#### Double stars in Lupus:

Gamma ( $\gamma$ ) Lupi is a very close mag 3.0 binary with a nearly edge-on orbit whose period is 147 years. Unfortunately the separation of 0.68" is too tight for easy viewing. *Epsilon (ɛ)* Lupi is also a difficult close binary: 3.4, 5.5; 0.6".

*Eta* ( $\eta$ ) *Lupi* is a pleasant fixed binary with slight colour contrast: 3.4, 7.8; 15".

*Kappa*<sup>1</sup> and *kappa*<sup>2</sup> form a wide fixed binary: 3.9, 5.7; 27".

**Mu** ( $\mu$ ) Lupi is a multiple system. AB: is tight at 5.1, 5.2; 1.2". The third component is much easier at 24".

Xi<sup>1</sup> and xi<sup>2</sup> Lupi are a fixed pair. This double is great for any telescope, the most attractive binary in Lupus: 5.3, 5.8; 10.4".

**h4788** is the southern-most of a triangle of stars a few degrees east of  $\varepsilon$  Lupi. A close double at 2.2" the stars are bright at 4.7, 6.7

*h4690* NW of alpha is an orange and white double 6.0, 9.0, 19" separation

# Deep Sky Objects in Lupus:

**NGC 5822** is a very large open cluster  $3^{\circ}$  SW of zeta ( $\zeta$ ) Lupi. of about a hundred stars.

The cluster is located  $2/3^{rd}$  the distance from alpha Centauri to  $\zeta$  Lupi.



NGC5822

**NGC 5927** is a dim globular cluster in a busy star field, 5° NE of  $\zeta$  Lupi.

Away to the south beneath the Southern Cross is the next picture.

# MUSCA – "The Southern Fly"

was introduced by Johann Bayer as *Apis*, "The Bee". It went through several name changes before ending up as *Musca Australis vel Indica*, (The Southern or Indian Fly). This was deemed necessary due to its Latin similarity with "Apus", and confusion with *Musca Borealis* – The Northern Fly, which is now abandoned but survives as the 'Flies of Aries' buzzing round the rump of the Ram. Although a small constellation Musca stands out just to the south of Crux.



Alpha Muscae a 2.9 mag star passes the meridian March 31, one day later than  $\alpha$  Crucis

#### Double Stars in Musca:

 $\beta$  Muscae is a rapid visual binary with a period of 383 years. Magnitude of 3.7, 4.0; and 1.3" separation will test the optics and collimation of your telescope

 $\theta$  **Muscae** is a fixed binary: 5.5, 8.0; sep 5.3". Easy to find on the south-eastern edge of the Coal Sack.

John Herschell found two doubles in Musca; h4498 6.0, 8.0 separation 9" can be found midway between *lamda Muscae* and *alpha Crucis*, and h4432 5<sup>th</sup> and 6<sup>th</sup> magnitude separated by a tricky 2.3" is midway, and slightly north, between *lamda Muscae* and *IC2602* in Carina

# Deep Sky Objects in Musca:

NGC 4372 is a rather faint globular cluster 1° SW of  $\gamma$  Muscae.

**NGC 4833** is a fairly bright (8th mag) globular cluster 1° north of  $\delta$  *Muscae* 



**NGC 5189** Is either a planetary or a reflection nebula. Compact and slightly flattened it is an interesting and curious object.



NGC5189

It's an interesting month and made better by dark cold skies.

Good seeing IC

Answers to Identification Quiz on pp7 & 12:

- 1) IC2602 (Southern Pleiades)
- 2) NGC3372 ('EtaCarina')
- 3) M11 (Wild Duck cluster)
- 4) NGC 7293 (Helix Nebula)
- 5) M25 (in Sagittarius)
- 6) M46 (Puppis)

Prime Focus Vol 10 Issue 3 April 2005