MACARTHUR ASTRONOMICAL SOCIETY Inc.

Journal

PRIME FOCUS

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President's Report.

Oh What a Night!

Well it all happened last month when our special guest Dr Fred Watson paid us a visit. As you know Fred is the Astronomer in charge of the Anglo-Australian Observatory at Siding Springs, his presentation was all about that thing that sticks you and me to the Earth, namely "Gravity".

Fred talked about matters ranging from Albert Einstein, gravitational lensing and stars that bend space and time. There was a lot packed into his talk and it was very entertaining, definitely in a style that only Fred Watson can deliver. Fred is a good friend of our society and has agreed to pay us a return visit in the future. All I can say is what a night!

Also on the night it was great to see some new members signing up which is just fantastic. Of course for existing members, please keep those renewals coming in. It's coming up to our Annual General Meeting due April 17, nomination forms for positions are in the back of the attendance book and must be mailed in or handed to the secretary of the society no later than 2 weeks prior to the AGM.

Tonight's Meeting.

Our special guest speaker for tonight is Professor Mike Dopita from the Australian National University Canberra. Professor Dopita's talk will be on star formation.

Previously Mike wrote to the society about his talk tonight as follows:

"Without star formation, we would not have galaxies. I'll review where and when star formation occurred throughout cosmic time, and in all sorts of galaxies, show how we can determine what star formation looks like at the different wavelengths observed with the Great Observatories (GALEX, SPITZER, HST etc) and how we can determine exactly how much has been going on".

It's a pleasure to welcome a guest of Professor Dopita's calibre. It's very

appreciated that professional Astronomers like Michael and Fred can make themselves available to the amateur societies. It's my belief that the more we pick up and learn about astronomy enables us to filter down information to the general public when we do our public nights, this can only be a good thing. I might at this point pass on a thankyou to John Rombi for extending the invitation for Mike's visit, well done.

The Dates

Please be aware that I have again provided only a short list of dates, still juggling balls in the air, so to speak. Please check either with myself or any one from the committee before heading out, but for the near future they should be ok.

24/03/06 Campbelltown Rotary Observatory.
25/03/06 The Forest
01/04/06 "Keep The Stars Shining" Family Camp, held at Tara Girl Guides field at Silverdale, near Warragamba
17/04/06 Annual General Meeting.

In some late breaking news we have now been invited to hold some member viewing nights at the proposed Stargard field, see November's journal for details about Stargard. Suffice to say I might have some more news about this in the next month or so, if further information is needed please email me at astrosharpe@bigpond.com.au or my mobile 0410 445 041 or call John or Lloyd.

Macarthur Space Cadets

For quite a while now I have been wondering how we can effectively reach younger people who have purchased their first telescope or have a keen interest in Astronomy. My thoughts are around children aged 9 up to teenagers and young adults who might benefit from belonging to a junior section of our Society. I am now in a position to announce the "Macarthur Space Cadets". The aim of the "Space Cadets" will be to teach a very simple and basic form of astronomy with a strong emphasis on simple telescope use and easy object location. Parents would be welcome to stay for the duration of the presentations or if they prefer can leave and return later.

Meetings will be the Campbelltown Public Library on the 3rd Thursday of each month from 5.30pm to 6.30pm starting next month. I plan to have some short observing sessions after closing the meeting, these would be no longer than say 30 minutes and would be held at an appropriate location outside the library. There is no cost involved in being a Space Cadet, however a gold coin donation will be sought to cover the room hire and minor expenses like paper and printing of lesson plans etc.

I believe as experienced amateurs we are very well placed to share our practical on-the-field experience and knowledge. Myself and another member Bruce Reardon will be involved in running the club. Bruce is a high school teacher specialising in junior science and senior biology. For my part I have experience in relating my experiences to young children, like scout groups and at our star nights.
Any members who wish to become a guest speaker for the Cadets or play a role in running this new section please let me know. Also if any members know of anyone who would be interested in Space Cadets Cadet please get them to contact me at astrosharpe@bigpond.com.au

Other things

May I remind everyone that renewal fees are now due so can you please attend to this straight away, it would be really appreciated. Better renew myself pretty soon as well! It's a busy period coming up, with a possibility of a room change due to the great comments about the location of last months meeting, the AGM and associated reports, Public Liability insurance renewal, Space Cadets, Stargard, guest speakers and field nights. Well that's about all for now, lots of things to do. Good stargazing.

Regards
Noel Sharpe President

Gravity According to Fred

How to provide a summary of Fred Watson's talk last month? – it would fill a novel. Yet I will try for those who may have missed it.

After starting with a picture of the Siding Springs dome looking very much like his own head, then dust devils on Mars – "where is this going" I thought. Then Fred tied it together with the ubiquity of gravity and described the procession though ancient science history of theories on gravity: Aristotle, Galileo, Descartes, Newton and his Principia – "the start of the age of reason'.

But there were problems with Newton's theory – for example it didn't explain the aberration in Mercury's motion.

Along came Einstein, born on 14th March 1879. In 1905 he produced 5 epoch making papers that established his reputation, one of which – the explanation of the photo-electric effect – was to later earn him the Nobel Prize.

But one also include his world famous Special Theory of Relativity (with $E = mc^2$). Later, in 1915, he produced the General Theory of Relativity, which was really all about Gravity. After that, nothing was the same in physics again. As Einstein said about gravity = acceleration: "It was the happiest thought in his life". Space-time is not a rigid framework but is distorted by gravity.

Then his talk really took off. The testing of Einstein's General Relativity – deflection of starlight by the Sun during a total eclipse on 29th May, 1919, a perfect explanation for the aberration in Mercury's orbit. Then followed the amazing phenomenon of gravitational lenses, explaining the paradox of 'double quasars', Einstein Crosses and Einstein Rings. Fred explained how such lensing can be used to learn about dark matter, with the quotation "galaxies are beacons of light mounted on hills of darkness."

Fred explored then history of black holes, starting with Roger Penrose who proposed the idea of a point where space is infinitely dense. The term was actually coined by John Wheeler in 1967.

Then we went beyond Einstein... Big Bang models. The 'empty universe' model which expanded forever, the 'standard model' which expands quickly after Inflation, then starts to slow down. But in 1998, the acceleration of the universe's expansion was discovered and Dark Energy – Einstein's abandoned Cosmological Constant - was 'discovered'.

The 'New Physics' with Quantum Physics, Planck scales (10^{-33}cm), multi-dimensions. And so much more.
Thank you Fred – please come again.
And bring your guitar with you. RB

Wot IC This Month
March 20 – April 16, 2006

Bright Stars at 8.00 pm

Sweeping from west to east in the South - Achernar, Sirius in Canis Major with Canopus, the mighty Roger, (Regor), the False Cross, Alpha Crux, Pointers in Centaurus.

Northwards- Hyades with Aldebaran and Orion sinking in the northwest, down low is Capella then Castor and Pollux, and Procyon in the small dog. The Sickle of Leo with Regulus is rising in the east, with Cancer and the Beehive Cluster directly overhead. Directly south (above) the Beehive is the asterism Head of Hydra.

Moon Diary

23rd March	Last Quarter Moon
29th March	New Moon
5th April	First Quarter
14th April	Full Moon

The Moon will pass Jupiter 19th March, Venus 26th March (morning), Mercury 28th March (Morn), Mars 3rd April, and Jupiter again on the 15th April.

Evening Planets

Mars sets in Taurus between the horns by 10 pm in March and just after 9 pm in April. By then it will be in Gemini and go very close to M35 on the 17th April. Not long now before "Ol' Red Eye" departs our evening skies.

Saturn rises in Cancer in mid afternoon and although past opposition is still bright. The rings are still open toward us but noticeably narrower than late 2005. It will set between 2 am and midnight through this month

Jupiter rises in Libra nor far from the star **alpha Librae** by 8.30 pm. It sets as early as 6.30 pm in April. Moving toward opposition in May it is gaining brightness and is already close to its maximum size at 44 arc seconds. The planet appears to go backwards for a couple of months now that it has started retrograde motion.

Neptune and **Uranus** continue to placidly and quietly go their respective ways in Capricornus and Aquarius.

Morning Planets

Venus rises after 2 am in Capricornus, moves briefly into Aquarius and then back to Capricornus again. The cloudy planet overwhelms Neptune on the 26th March, also in Capricornus this month.

Mercury rises 2 hours ahead of the Sun in late March and will reach its highest point above the horizon on the 9th April. Apparently this is quite a good time to view "speedy Gonzales" but you will have to grab the opportunity now.

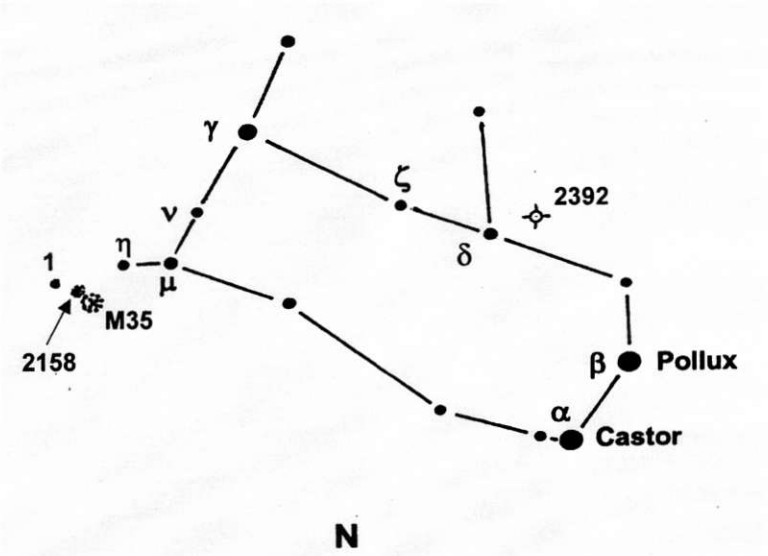
Meteors

The **pi-Puppids** are active between 15-28 of March with a maximum on the 23rd. Best seen before midnight they are slow, leave bright trails with occasional fireballs. Not many per hour but sound interesting.

Portraits in the Sky

Our focus is on the northern horizon this month and firstly that most ancient of constellations:-

GEMINI – The Twins



Many cultures since ancient times have seen this constellation as pairs of gods, humans, animals or plants. The Greeks named the two bright stars Castor and Pollux after the twins born to Leda a goddess seduced by Zeus, hatched from an egg. These twins sailed with Jason and the Argonauts and played a large part in saving the ship from a storm. Sailors therefore consider the star Castor a good omen. The Jews called them Simeon and Levi, the Romans Romulus and Remus the founders and guardians of Rome. In India they were called the two Horsemen or the Boy and Girl and the desert dwellers of Nth Africa saw them as the forepaw of an ancient huge Lion. The Chinese named them Yin and Yang and Ovid a Greek poet named them The Horseman and The Boxer.

Looking like a large rectangle north and east of Orion the two brightest stars, exactly 4.5° apart, are the heads of the twins with an extended line of six stars at the feet. Many of the main stars are unequal doubles.

β **Gem** - (Pollux) The Boxer is a 1.1 mag orange star still used in navigational tables. It is thought that Castor may have dimmed over time making Pollux brighter, or was Bayer just careless in allocating his letters?

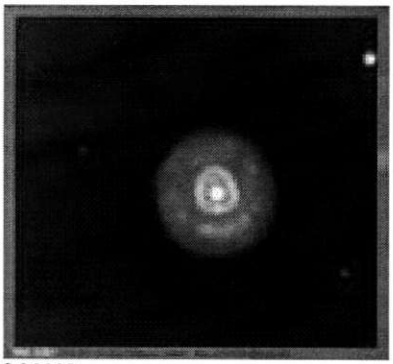
γ **Gem** - (Alhena) one of the feet stars midway between Pollux and Betelgeuse is a 2.2 mag bright white star.

Deep Sky Objects in Gemini

α **Gem** (Castor) The Horseman is a multiple system of six stars. A small telescope will show two blue-white stars at magnitude 2.7, 3.7 with a wide red dwarf companion. Both the blue-white stars are binary doubles and the red dwarf is also a double. Astronomers even up to recent times knew Castor as Apollo and its true orbit is yet to be calculated.

δ **Gem** (Wasat) is a yellow / red (or white and purple) mag. 3 and 8 double. While Clyde Tombaugh was looking here in 1930 he exclaimed 'Wasat' and saw Pluto sailing by.

Just 2.5° east of Wasat is **NGC2392 'The Eskimo / Clown face Nebula'** like a face framed in a fringe. A mag. 8 blue green ellipse for most of us, but large scopes show the 10th mag central star.



NGC2392

η **Gem** (Propus meaning – in front of) is an orange / red double varying slightly over a year. It was near here that William Herschel discovered Uranus (Yoo-rin-us) in 1781.

Between η and **1** making a triangle is **M35** a large 5th mag loose open cluster of 200 stars in curving chains. It is visible to the naked eye with clear skies and the same size as the full moon. Low power is recommended.

Just above to the left is a rich open cluster **NGC2158** seen as a small faint patch of light.

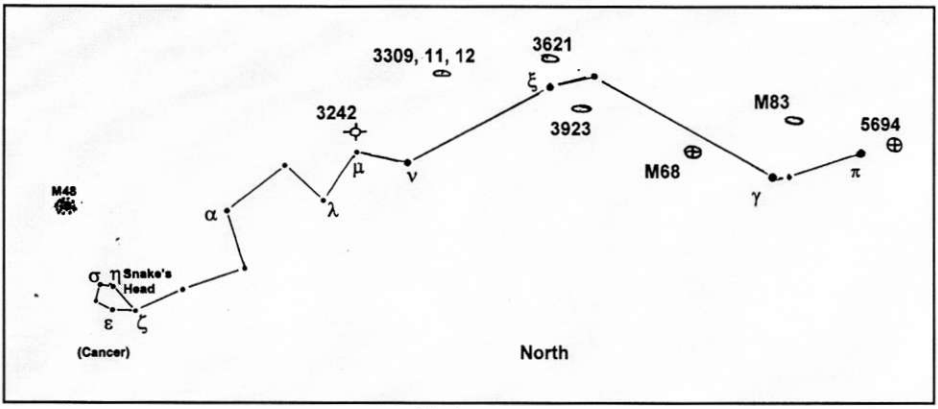
M35 & NGC2158

Now we go to the constellation that winds its way over 100° of sky and takes seven hours to pass overhead.

Hydra – The Watersnake

Hercules was given 12 tasks with the hope that he would be killed while achieving them. One was to kill the Hydra the Serpent with Nine Heads. Being a straightforward kind of guy with a club, he thought to bash all nine heads off one at a time.

However two heads sprang from the bloody stumps to replace every one he knocked off. But calling on his nephew to burn the stumps as he bashed them to pulp, he began to succeed in the long struggle.



Hydra

The goddess Juno resented his beginning to triumph, (she hated him for being the son of Zeus and one of the nymphs), and sent a large Crab to distract him by nipping at his heels. However Hercules crushed the crab underfoot without faltering, 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 perhaps?). Attempts have been made to break it up or create other shapes, notably an axe handle with Corvus as the head; or in 1805 Felis - The Cat.

In dealing with such a long asterism it helps to have some waypoints. 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 is located just above Cancer in our sky and includes δ a mag 4 blue-white star, ζ η and σ with ε a yellow/blue double.

Second waypoint is around α Alphard, an orange giant, which was called 'the solitary one' by the Arabs, but Tycho Brahe named it the Heart of the Hyda.

The next region is the stars ν, ξ, β and γ that swoop up around the borders of Sextans, Crater and Corvus. The Chinese called this long area the Green Hill. γ a yellow giant 100 ly distant, is on the east side of the Hill toward the tail of the serpent and the border of Libra.

There are faint galaxies along the whole length of Hydra, lots of double stars and a couple of bright planetary nebula.

Double Stars in Hydra

Epsilon Hydrae is a multiple binary in the Head of the serpent. Two stars can be seen and another is too close to split. Components A and C have a separation 2.9", which will require careful observation and excellent collimation, but the blue and yellow stars 3.4/6.8 are well worth the effort.

Struve 1316 magnitude 8.5/11.0 separation 13"an attractive double yellow. From Alphard go southwest to 21 Hya then just over 1° due west again will find it. The secondary will be faint but persevere.

Struve 1474 is a fixed binary located one degree northwest Nu Hydrae. AB: 6.8/7.9; separation 70", and C: 6.9, separation 76" form a wide wonderful triple.

Struve 1473 an attractive double just a further 0.5° north from 1474.

HIII 96 is a bright yellow equal pair with an orange red star to the northeast. A true binary 5.7/5.8 and just 10 arc seconds apart they make a fine view 2.5° due north of ξ Hya.

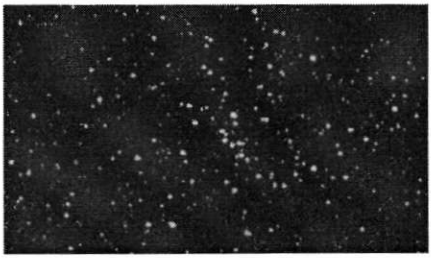
HN69 is found 3° due north of M83, the middle star in a rough line of 5 running east west. This bright pale yellow pair 5.8/6.7 magnitude and 10" apart are in an interesting field.

54 Hya located way east near the border with Libra is two pale yellow F class stars 5.0/5.0, separation 9.6".

Deep Sky Objects in Hydra

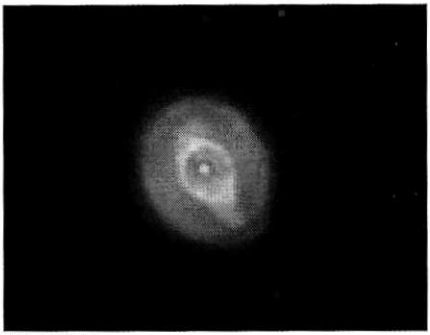
Hydra has three Messier objects and lots of faint galaxies. We will start from the Head and work to the east.

The first of our Messiers can be found by lining up ε and σ in the Head and extending out 10°. **M48** is 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



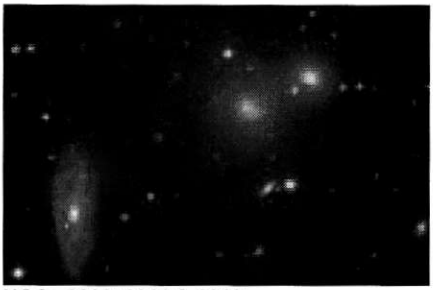
M48

NGC 3242 "Ghost of Jupiter" is a 9th mag planetary nebula, quite close to μ Hya. This, elusive to presidential eyes, nebula is a good bright object for small scopes



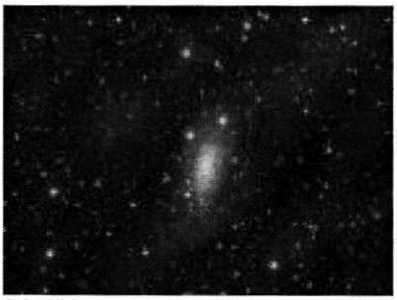
NGC3242

NGC 3309/12 is an interesting group of faint galaxies in the midst of a star cluster. For those with big apertures you may be able to spot the galaxies with the cluster in the foreground. 4° northeast from Alpha Antlia will get you there.



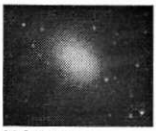
NGCs 3309, 3311 & 3312

NGC3621 is a spiral galaxy 1° south and 3° east of Xi (ξ) Hya. Lying in a trapezium and other interesting background stars, this is a faint but conspicuous galaxy.



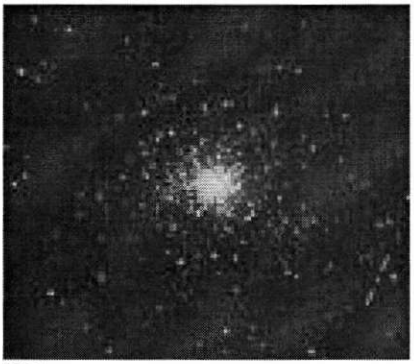
NGC3621

NGC3923 is an elliptical galaxy in the same area as double star HIII96. This 10.9 magnitude, fairly large object 6x4 arc minutes, can be resolved at the edges with 200mm aperture.



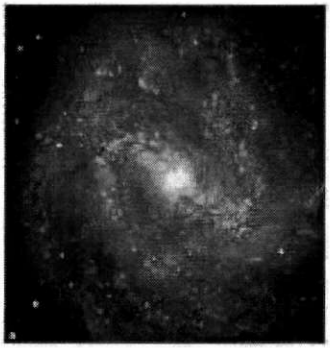
NGC3923

The second Messier **M68,** is a rich globular with some spiral structure. Line up γ and β Corvus and extend 3.5° to get your opportunity to resolve some of its stars with 150mm or greater.



M68

For our third Messier move further along the Hydra body till you find a distinctive large arrow head of four 5th mag stars to the south in Centaurus. Extend a line 3° from the western arm of this arrowhead to **M83** a large 8th mag face on spiral galaxy. This is easily seen with 150 mm or larger.



M83

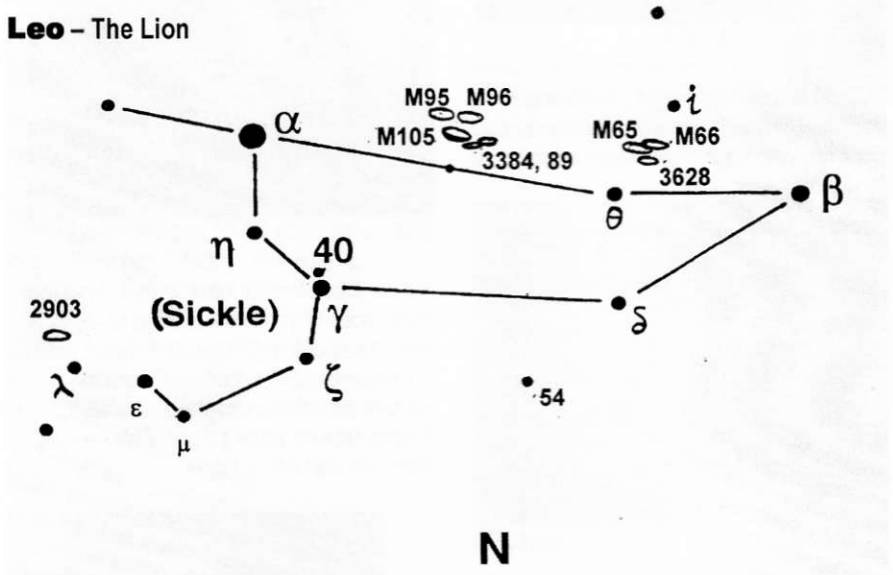
NGC 5694 is an extremely compact globular star cluster, thought to be in the region of 100,000 light years away. The cluster sits

just east of the mid-way point between pi Hydrae and sigma Librae, at the border with Hydra.

From pi Hydrae move east until you encounter a group of 5th magnitude stars lined up roughly north-south. These are 54, 55, 56, and 57 Hydrae. NGC 5694 lies 1° west of 57 Hydrae.

Our last asterism this month is the royal –

Leo – The Lion



The first of Hercules' labours was to kill the Nemean Lion, a giant beast that roamed the streets and hills of Greek villages, devouring everybody it met. The animal's skin was impervious to iron, bronze, and stone. Hercules' arrows harmlessly bounced off the lion; his sword bent in two and his wooden club smashed to pieces. So Hercules wrestled with the beast, finally choking it to death. To honour the great fight the Lion was placed in the sky.

However even before the Greek stories, the lion was an ancient symbol of power and kings were depicted flanked by rampant lions. Archaeological evidence suggests that the lion replaced an earlier symbol of kingly power, the bull, symbolizing fertility of the earth and animals.

This switch from a horned bull, to the lion could have been linked with a changeover from a lunar to a solar-based religion. The bull was identified with the moon, the lion with the sun. Kings preferred an animal of strength and power and a heavenly body that ruled the day with an annual cycle, rather

than an animal of fertility, and a night-time symbol with a short-term monthly cycle.

The constellation movements supported the ascendancy of the lion. The Lion is seen chasing the Bull over the horizon, announcing the end of winter in the northern hemisphere and the beginning of spring. Thus Leo, slayer of Taurus, dominates the summer skies.

Leo is a compact constellation and readily recognizable with many named bright stars.

Beta Leonis a white 2.1 mag star called "Denebola" which means the Lion's Tail, and naturally is the star at the end of the triangle forming the hind quarters of the animal.

Epsilon Leonis **and** ***Mu Leonis*** are in the sickle shape of the head. They are called "Al Ashfar", meaning the eyebrows.

Double Stars in Leo

Alpha Leonis - "Regulus" means 'one who regulates the heavens.' Copernicus named Regulus but the star was better known as *Cor Leonis*, the Lion's Heart. Regulus is a multiple binary. Component B is very wide (177") and has its own companion (2.6") a very faint 13 mag dwarf. The orbital period of B and C is about 2000 years.

Gamma Leonis - "Algeiba", is Arabic for forehead, but is also named *Juba*, meaning mane. This is a pair of 2/3 magnitude gold and yellow stars separated by 4.4".

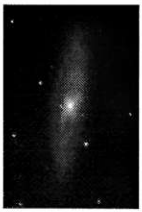
Iota Leonis is located halfway down the rear leg of Leo and is a good point to start looking for M65/66. It is a double with a 6th mag companion separated by 1.62" slowly increasing in distance.

54 Leo is a pale yellow and white unequal pair 4.5/6.4 separation 7" in a faint scattered star field.

Deep Sky Objects in Leo:

One of the hidden treasures of Leo is a galaxy right next to Regulus but hard to see in the glare. **Leo 1** is a faint spheroid dwarf just 20' from the center of 1st magnitude Regulus. You may have to blot Regulus out of view to the side to see this nearby curiosity.

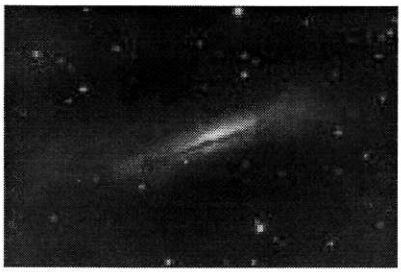
Leo has five Messier objects: **M65 and M66** is a pair of spiral galaxies in the same field, near Iota Leonis. Both galaxies are elongated north-south; M65 has a tighter spiral.



M65

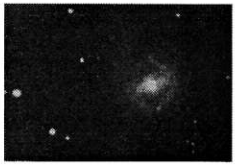
M66

NGC 3628 a faint wispy patch hovers just 1° north and between M65 and M66. Actually this is larger than either Messier object, but much dimmer because it is seen edge-on.

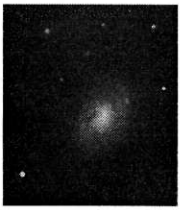


NGC3628

M95 and M96 form another nice pair, although farther apart. The two are found in a group of galaxies midway between alpha Leonis and theta Leonis, and just slightly to the south. M95 to the west, is a curious round object with a very faint circular bar. M96 is a tight spiral galaxy, much brighter than its neighbour.

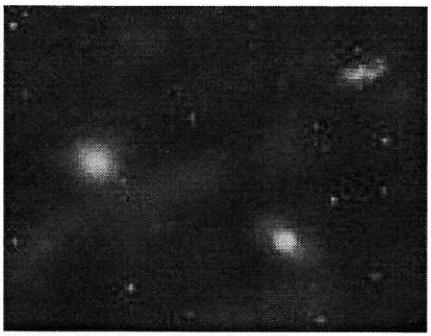


M95



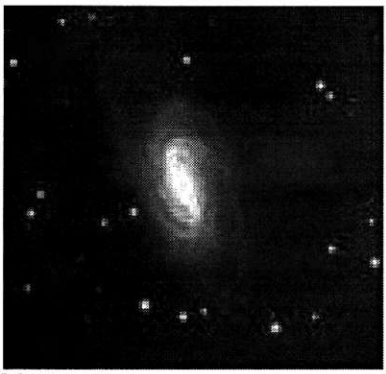
M96

M105 is a much dimmer galaxy to the north-north-east of M96. In the same field with 105 you may find **NGC3384** and **NGC3389**



M105 with NGCs 3384 & 3389

NGC 2903, somehow escaped Messier's telescope, even though it is brighter than any of the above Messier objects, and covers a larger area. It is an elongated multi-armed spiral at visual magnitude 8.9, located 1.5° directly south of ***lambda Leonis***.



NGC2903

Well there you are, quite a lot this month; but the nights are getting longer so you will have plenty of time.

Good Seeing IC

Joy in the Simple Things

Sometimes, as we delve into the obscure faint fuzzies and their ilk, we forget that what is simple and mundane to us can bring great joy to others. When I was on holidays on the south coast this month, I had occasion to invite my wife's cousin with her husband and friend to pop over to look through my telescope.

After some clusters etc, I ended up showing them Saturn and Jupiter at high mag. Well – it absolutely blew them away. The friend, whose birthday it was that day, was ecstatic to see such marvels – "thank you for such a beautiful birthday present" It was the first time she had ever seen the planets through a telescope. **Lesson?** Never underestimate the affect of the simple astronomical objects on people. RB