

MACARTHUR ASTRONOMICAL SOCIETY Inc.

Journal



# PRIME FOCUS

Volume 10 Issue 4

May 2005

|             |                |           |              |             |
|-------------|----------------|-----------|--------------|-------------|
| PRESIDENT   | VICE PRESIDENT | SECRETARY | TREASURER    | EDITOR      |
| NOEL SHARPE | JOHN ROMBI     | IAN COOK  | DICK EVERETT | BOB BEE     |
|             |                |           |              | Ph 46474335 |

MAS : Postal Address PO Box 17 MINTO 2566 Phone 0415915771

## President's Report

### Last time We Met

Our Annual General Meeting was held last month, reports were tabled and positions elected. We had a good turnout on the night and a video was shown afterwards. I wish everyone to know that is both an honour and pleasure to serve as President for the year ahead and I acknowledge the responsibility bestowed upon me.

Elected on the night was a great team of members who continually serve the society in an exceptional manner. For your information the management committee comprises as follows.

**President** - Noel Sharpe  
**Vice President** - John Rombi  
**Secretary** - Ian Cook  
**Treasurer** - Dick Everett  
**Committee members** - Bob Bee,  
 Daniel Ross and Lloyd Wright.

On behalf of the Society I pass on our congratulations. Also on the night our returning officer was John Casey - thanks John for performing that duty.

### Added Thanks.

I would like to thank Lloyd Wright for helping out with the Forest nights, especially the breakfasts and Ned Pastor for the collection and return of keys for these nights. Thanks guys.

At last month's meeting I acknowledged the fine efforts of many members. Sometimes though it's hard to remember everyone, so please except my apologies if I have ever inadvertently missed someone. But I did miss Ian Cook. Ian puts a lot of work into the Society and this is readily evident in our journal as Ian writes the "What IC this Month". The articles are packed with information and sometimes amusing commentary. Ian also handles all the Society's correspondence, minute taking and finds time to actively stargaze. Thanks Ian!

## Tonight

Our guest speaker tonight is Zane Hammond who runs the Magellan Observatory, Zane will be presenting us with some of his excellent Astrophotography, as well as giving us a run down on his observatory and farm stay facility. We have now confirmed a visit to Magellan on Saturday the 4<sup>th</sup> of June. It's a great opportunity to grab some fantastic dark sky observing and look through a really big telescope, namely the 18 inch reflector.

I am hopeful of making an announcement tonight regarding future speakers for our Society, as of time of writing this is still a work in progress.

### ACTIVITIES

|          |                                 |
|----------|---------------------------------|
| 04/06/05 | Magellan Observatory            |
| 10/06/05 | Campbelltown Rotary Observatory |
| 11/06/05 | The Oaks                        |
| 20/06/05 | Monthly Meeting                 |
| 02/07/05 | The Forest                      |
| 09/07/05 | The Oaks                        |
| 18/07/05 | General Meeting                 |
| 30/07/05 | The Oaks                        |

As always please be aware that changes can happen so please check in with John Rombi or myself on 0410 445 041.

I'll sign off at this point and thanks again for all your support.

Regards  
Noel Sharpe

## A Brief Analysis of Matter

By Frank Kish

This is the 6<sup>th</sup> and Final Instalment of Frank's epic (and hardly 'brief') article.

### 6) THE ULTIMATE END-STATE OF MATTER

The end-state of matter is synonymous with the dying of the Universe.

The fate of the Universe was *imprinted* right at the Big Bang, which we could decipher if we had enough knowledge of the *quality* of the material particles and their *quantity* i.e. the *density* of the Universe. The fate of matter then depends on how long the Universe is around for the hitherto unknown cosmological processes to work themselves out.

The prediction that the Universe will end one day due to 'heat death', was based on the 2<sup>nd</sup> Law of Thermodynamics. This law is considered to be the *supreme jewel* of macroscopic physics. The Law states simply that all natural processes tend to *increase*, (i.e. degrade) or at best remain *constant*, in the *time-direction* of the arrow of time, (i.e. future), from an ordered structure, in a *closed* physical system, towards disorder or *thermodynamic equilibrium* at Absolute Zero of -273° Celsius, (Zero Kelvin). At this point the thermal motion of atoms and molecules ceases as far as the uncertainty relation permits it. In *thermodynamic equilibrium*, a collection of particles and photons will usually have an even distribution of energies.

The *history* of hydrogen fuel began when after the initial few minutes of nuclear fusion of the Big Bang stopped and most of the atoms of the Universe "frozen" in the form of hydrogen. Similar nuclear fusion continues ever since

inside the stars. This hydrogen fuel drives most of the activity in the Universe today, which activity is the carrier of the *imprint* of the *time-direction*, (the arrow of time) towards "future, continual *degradation*".

Many cosmologists consider the Universe to be a *closed system*, characterized by a so called "branch system", which allows the *Law of Thermodynamics* to apply. Hence, eventually the Universe too may reach its ultimate end-state of "*heat death*".

The *thermodynamic laws* apply only to large (macroscopic) numbers of particles and photons, and these laws are intrinsically **statistical** in nature. (An atom has no temperature).

In the 2<sup>nd</sup> *Law of Thermodynamics*, the *degree* of the quantifiable disorder is called **entropy**.

The *Law of Entropy* states that the *progress* of natural processes towards *degradation* in the *quality* of matter and in their movements *never* decreases and it is **irreversible**.

Note that an inbuilt *time-direction* does not apply to either the laws of mechanics or the laws of electromagnetism.

The full understanding of **entropy** is important for two reasons:

**a) The Law of Contingency of matter.**

The nature of *entropy* that points to a precisely definable and irreversible progress towards degradation in the physical reality is analogous to the *Law of Contingency*, which is applicable to the attributes of *finite matter*. This *contingency*, which seems to contradict the concept of *infinite matter*, is clearly manifested all about us in the physical reality. This is the phenomenon in atoms, when energy is dissipated in the form of photons or alpha and beta rays. This is represented by

material *degradation* due to age and corrosion, which causes physical entities fall apart, wear out and crumble. This also points to the dying stars;

The gravitational force of the Milky Way moves our *Solar System* around the outer edge of the Galaxy at a speed of cca. 400 km/sec. This is about equal to flinging the entire solar system across one and a half width of the Australian continent in 15 seconds.

The *star* nearest to Earth is our **Sun**; The Earth, one immense Planet and it is being whipped around the Sun *by the power of the Sun*. This Sun, each second, transforms four million tons of its energy into *light* as radiant energy for the past five billion years. The loss of this massive energy is analogous to the burning down of a candle, *it cannot last forever*. The natural tendency for temperature to fall from high to low, (heat always rolls downhill) points towards the continual dissipation of heat to the surrounding space, and ultimately to the "*heat death*" of the Universe.

Meanwhile, the concluding act, which is running parallel with the inexorable march of the Universe towards its "heat death", seems to be played out in the struggle between gravity and thermodynamics.

**b) The Degradation of the Environment.**

The above consideration of *entropy* applied to *closed* physical systems, where entropy *increases*, such as the Universe. However, in an *open* physical system, *entropy* could **decrease** but at a "*price paid elsewhere*". This of course could apply anywhere in the Universe, nevertheless it is most clearly evident in the *contingent* nature of the

*biological life*, its growth, its development, and the *Environment* as a whole on Earth. The *energy transformation* of the Sun is fully understood, together with the way nature turns it to our advantage in sustaining the highly *contingent* biological existence on Earth.

The modern *industrial* West has developed intricate and effective methods for maintaining the ever increasing drive to *consumerism*. The **price** "paid elsewhere" is then all what science, technology, and the business of mining, agriculture, commerce, construction industries, etc., are all about. They are trying to satisfy human requirements for providing and improving habitat/ sustenance /health/ entertainment, all of course at a price paid through global *degradation* of the environment.

As a consequence, the global *environment* is being put under stress continually through the pollution of oceans, rivers, earth and the air. This alarming process of *destruction* cannot be *slowed down* or *reversed*, but it may only be controlled through creating more pollutants as by-products of consumerism. Recycling is another paradox; because it is the material only that is saved, but new energy still has to be spent.

Warning: Already the Earth gains no net energy from the Sun any longer, because the same amount of energy is *returned* to space in the form of infrared radiation. The Earth has long since passed this energy balance. There is now only an average of 23°C ambient air temperature globally, due to the "greenhouse effect" of CO<sub>2</sub> and H<sub>2</sub>O in the air.

All these unsettling phenomena could be summed up simply by saying that we are not having an "*energy crisis*" but "*entropy crisis*".

It appears finally, that the Second Law of Thermodynamics is an **absolute ruler** of the Universe.

*Entropy* being *irreversible* makes some scientists wonder: "Does the irreversibility principle mean perhaps an incompatibility between Quantum physics and the Theory of Relativity?" (i.e. indeterminism versus determinism.) There are some problems that require further study.

The following will sum up the three **Laws of Thermodynamics**:

**The First Law:** This is the so called *Energy Principle*, which states that the **quantity** of energy is *conserved*, which means that the *Total Energy* of the Universe is constant at Zero degree K. Although forces could come and go, energy was here to stay.

**The Second Law:** This is called the *Entropy Principle*, which states that the **quality** of energy is *changed* in a closed and natural system, at the expense of the quality, the *entropy* of that system statistically *increases* through an *irreversible* process.

**The Third Law:** Absolute Zero is unattainable in a finite number of steps. At Zero K temperature all forms of matter become perfectly ordered (usually perfect crystals). This Third Law may not be a true law, as the other two, because of the assumption of the atomic nature of matter.

All these laws are intrinsically mathematical subjects, set out by Clausius as *functional*

*thermodynamics* and by Boltzman as *statistical thermodynamics*.

As a matter of interest, Ludwig Boltzman's tombstone in the Vienna central cemetery has the equation in the inscription, which reads:  $S = k \log W$ . (Meaning: Entropy=Boltzman Constant x log of Measure in a chaotic system).

#### **Final warning:**

"Not knowing the *Second Law* is equivalent to not having read a work of Shakespeare."

### **CONCLUSION**

Recapitulating the content of this paper, these are the comments that may apply to the individual sections:

1) **What is Matter:** There is no conclusive statement on this complex question. The problems are centered on Einstein's Theory of Relativity, the Quantum Theory and the conflicting Cosmological Models.

2) **Origin of Finite and Infinite Matter:** There is no scientific evidence for or against any kind of origin, shown by the disagreement among the Cosmological Models.

3) **Infinity and Causality:** There is no agreement among the scientists on these topics.

4) **Origin of Matter by Chance:** This theory falls into the same category as Item 3.

5) **Evolution and Properties of Matter:** There appears to be a general agreement on these.

6) **The Ultimate End-state of Matter:** The Law of Thermodynamics is questioned on

account of its statistical nature, and whether the Universe is truly closed. The Law of Entropy is also doubtful on this account. The Law of Contingency with regard to environmental degradation is, however, neither questioned nor denied.

It appears from the study of the scientific theories that many of the theories are either incomplete and or they omit some of the contentious items listed in this Conclusion, for reasons only known to them.

This sums up the general analysis of matter.

Frank Kish

### **Ghost Busters**

Scopes of all shapes and sizes were ready for action at "The Oaks" a few weeks back. What made this a great night was the crisp and dew free night. Unfortunately the seeing was poor upstairs but who cares when you're having fun in the dark.

The on ground conditions were excellent and it was great to see some new faces on the field. I tried for ages to grab that view of the Sombrero Galaxy, using a slightly off beat way of star hopping. I finally found it, a very nice view indeed.

What was a real challenge was locating the planetary nebula called "The Ghost of Jupiter". The ghost lies in the constellation of Hydra and glows at mag 7.8. It's not a faint fuzzy and holds good company with the Helix and Dumbbell nebulas, these three are fantastic examples of planetary nebulas and definately obtainable in most of our scopes. The only problem is where to find them.

I made a total shemozzle in the search for "the Ghost", without the aid of those new fan dangled "Go To's" I had to do it the old way. Now I have been a very productive little Astrophotographer in the past but sadly my hunting skills are not quite up to speed.

Nevertheless with Bob Bee's guidance I banged off a sighting of the Ghost surprisingly quickly, but by the time I clamped up the old equatorial it had vanished, like most good ghosts do.

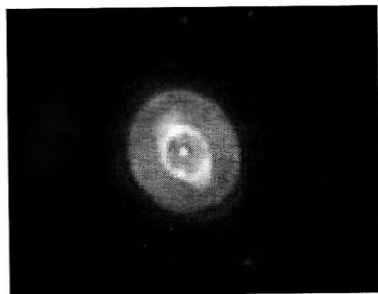
So the search continued, and continued, all the way to a rising moon. Then at the last minute there she was, a beautiful greenish hued ghoul of a thing. This time no mistakes were made and the scope was successfully clamped up, motors engaged and a sight for all to see.

Rising, rising the moon did rise, but I stayed on the Ghost as she disappeared into the ever pailing night sky, this was a night to remember. So if you're ever out ghost hunting take this heed, once you sight the ghost never take your eye off her, she might just vanish on you!

Fare de well from,

A humbled deep sky hunter

NS ■



## Wot IC This Month

May 17 – June 19, 2005

### Overhead at 8.30 pm

South - Canopus rides high overhead, Puppis follows the Dog, then Regor, False Cross, Alpha Crux, Pointers in Centaurus with his spear stabbed into Lupus and Scorpius plainly in view from the east. Sagittarius and the galaxy center are coming.

North - Saturn sinks to the west followed by doubled Castor and Pollux, the Sickle of Leo with Regulus, and big bright beautiful Jupiter and Spica in Virgo lie to the north. Libra and Arcturus appear from the northeast and Hercules with the Snake Catcher Ophiuchus, above like a shield

### The Moon Diary

16 May First Quarter; 24 May Full Moon;  
30 May Last Quarter; 7 June New Moon;  
15 June First Quarter.

### Evening Sky Planets

**Venus** will rise after sunset round 6.15 – 7 pm till July moving quickly from Taurus to Gemini and on to Cancer. It will approach **Saturn** during June pursued by **Mercury** and by the time of our next meeting, they will all be dancing together in the western twilight glow. There has to be a photograph in this!

**Jupiter** spends the entire year in Virgo beautifully bright and clear all this month. Rising during afternoon daylight and setting between 3 am shortening to midnight by mid June. On 19-20 May a nearly full Moon will pass close by and again on 16 June. An opportunity to view Jupiter during daylight

using the Moon as a guide is explained in Astronomy 2005.

**Neptune** starts its retrograde motion going back to the west this month. Rising in Capricornus around 11 pm and visible till morning it is about 1.5° below Iota Cap.

**Mars** rises in Aquarius just after midnight and sets 13-14 hours later in daylight. On 31<sup>st</sup> May the last quarter Moon will be about 5° below and between Mars and the green planet Uranus.

**Uranus** stays in retrograde motion just 1° from 73 Aqu. rising around midnight to 10pm. Uranus and Mars are about the same size in the sky but there is a 4 magnitude difference in their respective brightness.

### Comets

**T4 Linear** is travelling northwest through Fornax and Eridanus this month. It is briefly brightening to 7-8<sup>th</sup> magnitude before finally departing..

9<sup>th</sup> magnitude **9P Tempel** will be right up close to the bright star Delta Virginis on the 30<sup>th</sup> May

### Meteors

The **eta-Aquarids** appear from 19 April to 28 May and although past their peak by now you may see some fast bright yellow streakers from the northeast after midnight.

## Portraits in The Sky

### Boötes – The Herdsman

Some stories represent Boötes as a hunter on the track of the Great Bear. Yet it was once known as Arctophylax, which means the protector of the Bear. Perhaps it was the Romans who changed his role, for they called him Venator Ursae: the Bear Hunter accompanied by his two dogs Asterion and Chara, the "Canes Venatici".

Nowadays Boötes is generally considered to be a Herdsman (French: Le Bouvier), as he eternally shepherds the stars around the North Pole. The constellation was known in antiquity, being mentioned in Homer's *Odyssey*. The constellation is compact though large, squeezed between Canes Venatici and Hercules, with Virgo to the south.

Arcturus is the brightest star in the constellation and means "Guardian of the Bear". A line from Spica in Virgo through Arcturus, will guide you to the tip of the Great Bear's Tail, low on the horizon during May/June. This orange-red giant is about 20-25 times the size of the Sun and 35.4 light years away. The Sun will probably balloon to the size of Arcturus in another five billion years.

The constellation has a fine collection of **Double Stars**,

**Zeta Boötis** is a fast binary with a highly eccentric orbit of 123.4 years. The companion is less than 1' separated.



**Epsilon Boötis** 2.5, 4.9, is a bright yellow with a blue-green companion. The orbit is very large and current separation is 2.8'.

**Kappa Boötis** is a gorgeous double yellow and deep blue. The separation is 13.4'. In the same field is **Iota Boötis** 4.9, 7.5, separation 38.5'

**Mu Boötis** is a triple system. AB 4.3, 7.0, separation 108'. The component B has a close companion C (mag 7.6) with an orbit of 246 years, current separation is 2.1'.

**Pi Boötis** is a pleasant binary of two blue-white stars (4.9, 5.8, separation 5.6').

**Xi Boötis** is a rapid binary (4.7, 7.0) with orbit of 151 years. The primary is yellow, and the companion a white-pink. Currently the companion is found at 6.8' separation.

**Struve 1785** is another attractive binary, with an orbit of 155 years. The companion is at 3.3' separation.

**Struve 1909** (44 Boo) another double has an orbit of 225 years. Presently the secondary is at 2.2' separation.

There are no Messier objects in Bootes. Two of the better deep sky objects are: **NGC 5248** a very compact spiral galaxy in the southwestern corner of the constellation, ten degrees south of Arcturus and one and a half degrees west.

**NGC 5466** is a large but quite dim globular cluster. It's found nine degrees north of Arcturus and one and a half degrees west. (On the same declination is M3 five degrees due west in Canes Venatici.).

Turning to the southern sky this is prime viewing time for Centaurus.

### "The Centaurs"

Centaurs were half-men, half-horse and usually rather wild. Hercules came to visit a friend of his named Pholus who was a kind and timid Centaur. Finishing the sumptuous meal provided by Pholus, Hercules behaves like a clumsy guest and foolishly and without permission opens a cask of special wine reserved only for Centaurs. The Centaurs living close by catch the perfume of their special wine, wafting across hill and dale, and they fly into a rage. They rush over to the dinner party arming themselves with axes, huge boulders and ripping out trees to use as clubs.

Pholus takes fright and runs into another room leaving Hercules to battle it out. After killing a number of Centaurs face to face Hercules chased the rest of them over the hills to the cave of Chiron their king, shooting arrows as he goes. Shooting at one fleeing Centaur, Hercules sees it pass right through him and strike Chiron on the knee.

Hercules was devastated, because Chiron was a great friend and kindly patron of himself. He knew that all his arrows were deadly being tipped with poison so each was fatal no matter how slight the wound. Chiron was immortal, so the poison couldn't kill him but would cause him great pain that would last forever. There was nothing Hercules could do to help his friend.

Deep inside his cave, Chiron's screams of agony echoed throughout the cavernous chambers and could be heard all over the hills.



After weeks of listening to his torture, Prometheus took pity on the long-suffering Chiron and offered to take his immortal place and allow him to die. Zeus agreed to the exchange and Chiron died, his agony finally coming to an end. Zeus placed the great king of the Centaurs in the heavens.

However there's more, while Hercules was away chasing centaurs, his friend Pholus came out of hiding and looked over the dead and dying. Wide eyed with wonder he pulled an arrow from a body to inspect how it could be so deadly. Would you believe it! It slipped through his fingers and jabbed him in the foot, killing him instantly.

Hercules hearing of the tragedy, returned to bury his friend. Zeus (or Jupiter as the Romans knew him) had regarded Pholus highly, and put his likeness in the heavens along with Chiron. Thus the constellation Centaurus represents two Centaurs: Chiron and Pholus.

Centaurus is one of the largest constellations in the sky with a clearly discernible shape. The huge form faces east, with a sword waving menacingly toward Lupus the Wolf on the west. The constellation has an almost complete list of Bayer stars except for *omega*, which isn't a star, but a well known Globular Cluster. The front hooves are two bright stars: Alpha and Beta Centauri, known also by the Arab names of Wazn and Hadar.

**Wazn** or **Alpha Centauri** is best known by the name "Rigel Kentaurus", or the Centaur's foot. This is a three star system which is the closest to our own Sun. **Alpha<sup>1</sup>** and **alpha<sup>2</sup> Centauri** are a noted binary, 4.3 ly away, each approximately the size of our Sun. They

have an orbit of 79.9 years and are separated by 14 arc seconds (14"), which is decreasing.

The closest star to us is actually **alpha<sup>c</sup>**, known as **Proxima Centauri**. This is a red dwarf star with visual magnitude 11.0 and a distance from us of 4.2 light years. The star has a diameter of about five times that of the Earth and is about a sixth of a light year away from the other two. **Proxima Centauri** is also a flare star and is known as variable V645 **Centauri**.

**Beta Centauri (Hadar)** is 0.6 visual magnitude and a difficult double because of the primary's brightness 0.58, compared to the companion 3.95. The separation is 1.3". The orbit has not been calculated, but is thought to be at least several hundred years.

**Gamma Centauri** is a visual double of two nearly identical stars 2.9, 2.9 mag. Separated by only 1.0", with an orbit of 84.5 years, it is too close for most of our scopes to split. More enjoyable is **Kappa Centauri** which also has a faint companion: 3.1, 11; separation 3.9"

#### Deep Sky Objects:

**NGC 5139**, also known as **Omega Centauri**. This globular cluster is the finest in the heavens. It's so bright and compact, Bayer thought it was a hazy star, and named it *omega*. The cluster is estimated to be from 15,000 to 25,000 light years away, and may have over a million stars. It lies between *gamma* and *zeta Centauri*, about 5° west of *zeta*.

**Centaurus A - NGC 5128** is a radio galaxy that emits 1000 times more radiant energy than the Milky Way. Located 4.5° north of Omega Centauri it appears as a giant

elliptical galaxy with a strange dark band across the centre that you can see with 100 mm telescope or larger. It is thought the band is the result of a collision with a spiral galaxy in the past.

An interesting area near the hind legs of the centaur (on the Carina side) holds **NGC 3766** a naked eye open cluster and **NGC 3918** – *The Blue Planetary*. Discovered by John Herschel it looks similar to Uranus but three times larger.

Moving to the gap between Canopus and Sirius we can find:

### **PUPPIS – The Ship's Stern**

Puppis, "The Stern", or Poop Deck, sails into the zenith in January, but at the moment is in the west; and is the largest sub division of the former constellation "Argo Navis" - the Argonauts' Ship. It was Lacaille who broke up the older constellation in the mid-18<sup>th</sup> century, making four smaller parts: Carina, Pyxis, Puppis, and Vela.

The constellation spans a rich area of the Milky Way, guaranteeing a number of fine objects to study. It does not have a complete set of Bayer stars due to being split off from the large older constellation.

### **Double Stars:**

***k*<sup>1</sup> Puppis** and ***k*<sup>2</sup> Puppis** form a noted system of nearly equal stars: 4.5, 4.7; separation 9.9". Note that the "k" here is not "kappa"; many of Puppis' stars are English labels.

### **Variable stars:**

If you have sometimes thought to try variable star observing here's your chance.

***Rho* ( $\rho$ ) Puppis** changes magnitude varying from 2.68 to 3.87 every 3.5 hours. You could see the difference in one Macastro observing night!

### **Deep Sky Objects:**

**M46 (NGC 2437)** is a fine open cluster of perhaps five hundred stars about 4000-5000 light years away. Sitting on the northern edge of the cluster is a planetary nebula, **NGC 2438**, which is about 3000 light years away. The cluster is found in the northern portion of the constellation, 11° east of Sirius (alpha CMa) and 2° north.

**M47 (NGC 2422)** is a bright open cluster in the same field as M46, just 1° west of M46. Of the two, M47 is the brighter, as it includes several 5<sup>th</sup> and 6<sup>th</sup> magnitude stars.

**M93 (NGC 2447)** is another open cluster, quite bright but smaller than the two previous objects. It's found 1.5° NW of xi Puppis.

**NGC 2477** is a very fine globular cluster 3° NW of zeta Puppis, nearly half way between pi Puppis and zeta Puppis.

Good seeing

IC



**M47**

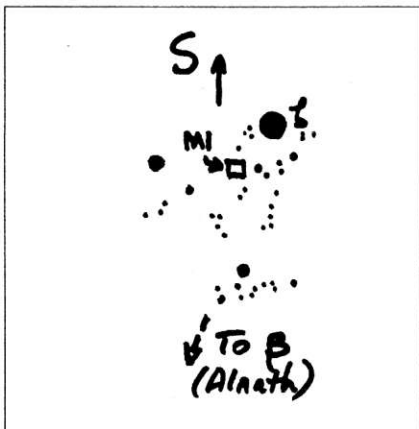
## Some Observations from the Oaks

Saturday 30<sup>th</sup> April at the Oaks was a great night in many ways, despite the obvious amount of moisture in the upper atmosphere, with resultant poor seeing.

I took the opportunity to follow a program of viewing that would add to my Messier tally and also expand my general survey of stars, clusters and galaxies.

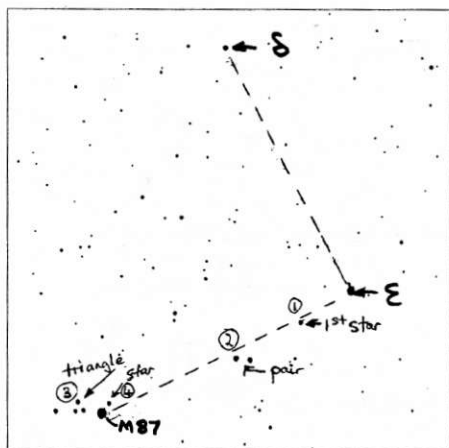
The first project, Messier hunting, took a bad hit from moment one – most of my targets (to fill the gaps in my current Messier tally of 79) were low in the northern sky. M51, 106 in Canes Venatici and M97, 101, 108 and 109 in Ursa Major were casualties of the city light glow, air pollution on the horizon and the Show Ground (or air field) flood light. I gave up hunting for these as an exercise in futility.

I was a bit more successful with M1, the Crab Nebula in Taurus. Even this was very close to the horizon, but being in the west, at least there was less light glow. Considering its fame, the Crab Nebula is not easy to observe through a telescope. After pointing my scope at where 'it ought to be' (very close to zeta [ $\zeta$ ] Tauri) and not finding it, I used my Herald-Bobroff star atlas to identify distinctive star patterns. (See Sketch 1.) Even then, I found it more by luck than anything. It was so faint, best observed with averted vision. This may have to do with the night's bad seeing. However, I called over Lloyd and Dave and they confirmed my sighting of M1. I will find it again another night with better seeing to appreciate it more.



(Sketch 1)

Then I moved to Virgo to spot M87. Odd as it may seem, I had 'nailed' the other Messiers in Virgo and Coma Berenices over a year ago when down at the Forest, but for reasons that escape me, I never confirmed a sighting of M87. I wanted to correct that tonight. I started off by using a chart I had printed out earlier off *Starry Night* to give me star patterns to work from. It should have been easy but because of the light pollution and bad seeing, even these guide stars were not that visible. I started from epsilon ( $\epsilon$ ) Virginis, following a line at right angles to the line from delta ( $\delta$ ) to  $\epsilon$ . (See the Sketch 2.) I looked for the single star (1), then the pair (2), then the triangle (beyond M87). I estimated the location of M87 in the finderscope from the small triangle(3) and the lone star (4) on its right. This was very frustrating, especially in locating the guide stars. But eventually I was able to and located M87 as a small concentrated core with a faint glow around it. I am sure it would have been more impressive with a darker sky (say from the Forest).



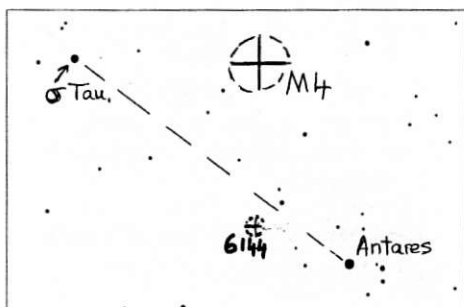
(Sketch 2)

Noel was able to confirm my sighting of M87, and that was the end of my Messier hunting for the night. All other visible Messiers on that night had already been ticked off my list. That's 81. How many to go?

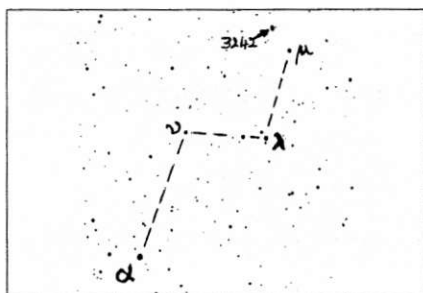
I then switched to viewing other interesting objects which I had listed as possibles for the night.

Dave Hall was set up beside me that night, with his 200mm Dob. We were discussing the globs in Scorpius, M4 and M80, which I had already checked out. Dave advised me there was another glob in Scorpius very close to Antares. That was news to me so I decided to check it out. Sure enough, in the location within about  $\frac{1}{2}^\circ$  from Antares (shown in Sketch 3) was this faint glob. Lovely!

Then I moved on to **Hydra** to find **NGC 3242**, the famous **Ghost of Jupiter** (see Noel's article earlier.) With the help of Bobroff and star hopping I eventually nailed it. First you move along Hydra from  $\alpha$  to  $\mu$  (see Sketch 4).

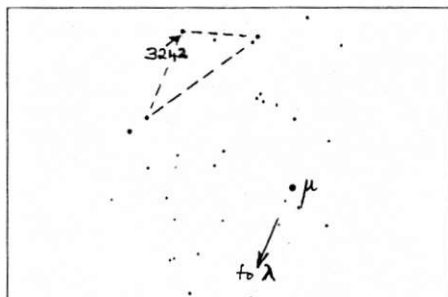


(Sketch 3)



(Sketch 4)

Once at  $\mu$ , move about  $1\frac{3}{4}^\circ$  south and locate the guide stars (two pairs) on the next sketch 5. They form a shallow triangle with 3242.



(Sketch 5)

It looks like a bluish planetary disc – easy to understand its name.

There were other discoveries that night that will have to wait another time. RB