

MACARTHUR ASTRONOMICAL SOCIETY Inc.

Journal



PRIME FOCUS

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President's Report

Good evening and welcome to all members and guests, and a special welcome to all the newcomers who have joined our society recently. Well done! Last month we were privileged to have Dr Andrew Hill as our guest speaker. Dr Hill is a research scientist from the Australian Centre for Astrobiology based at Macquarie University.

Dr Hill gave us many insights into the smaller universe, the one that exists in the microbiological world. The current thinking is that bacterial life could exist extra-terrestrially, maybe in the tails of comets, or near thermal vents deep within far off worlds, maybe even in the odd Martian meteorite.

To put an Astronomical spin on our last two fantastic speakers let's think about the

following. Jupiter's moon *Europa* has a liquid ocean underneath that incredible ice sheet. A NASA probe reveals thermal activity deep within the core of the moon. Locating where the ice is thinnest the probe drills down to detect small life forms living near the thermal activity. Maybe the tug of Jupiter's gravity helps to keep the core hot. Soon after that discovery the NASA Planet finder observes directly one of the extra solar planets, only this one is earth-like and only a hop skip and a jump away at 45 light-years.

The newly commissioned SETI array acting in concert with the NASA's Planet Finder detects signals of an Extraterrestrial nature. Is this science fiction or are we reaching into the early frontiers of major scientific discoveries?

Did we all see the ABC's Catalyst and The Big Picture the other week? Very coincidentally the subjects discussed at our last two meetings were covered in much detail on these programs. In particular our guest speaker in July, Dr "Doug Vacooh" has enjoyed a wide media profile in his duties as representative of the SETI Institute of California.

The Australian Centre of Astrobiology featured very well on Alien Underworld, which aired on Channel 2's The Big Picture. This brings us to tonight's meeting where our own Peter Druery will update us on a whole range of news and the latest discoveries, thanks Peter. I would like to take this opportunity to acknowledge everyone who has been involved with all the fantastic Public education programs we have been doing lately. Well done and thank you.

Well that's about it for me. Please remember that some revised scheduling has taken place at the last minute, so please refer elsewhere in Prime Focus for the details. As always my hope is for clear skies and plain sailing, well maybe a good dash of rain would help as well, providing it's not on the scheduled nights we have!

Kind Regards

Noel Sharpe
President

A Glance at the Year

5/10 – Belanglo Forest
12/10 – Obs. Public Night
21/10 – General Meeting

2/11 – Belanglo Forest
9/11 – The Oaks
18/11 – General Meeting

7/12 – Belanglo Forest
14/12 – Christmas Party

(Whew!!)

The Southern Aurora

Some of us at the Belanglo night on 7th September were fortunate to witness a display of the Aurora Australis. Though we dragged from our beds at an ungodly hour, we didn't mind a bit after we saw the spectacular curtains of red and purple soaring above the southern horizon and through the trees.

Here's a bit of information about this phenomenon.

The Aurora Australis occurs most frequently at 60 to 90 degrees latitude, but is not restricted to this boundary. They are named specifically for their location since they occur in both the northern and southern hemisphere. The term Aurora Polaris, polar lights, is a general name for both. It is an emission of light by means other than combustion and therefore occurring at a lower temperature than are required for combustion.

Though the Northern and Southern Lights occur from the exact same phenomenon, many people have never heard of the Aurora Australis because, in contrast to its northern counterpart, the area surrounding the Southern Lights is relatively uninhabited.

The Aurora Australis is electrically charged sub-atomic particles (solar wind). This wind flows around the planet, hitting the earth's magnetic field at approximately 400 kilometers per second. This field deflects the stream toward the poles, where the electrically charged particles react with the chemistry of the upper atmosphere. The resulting electrical current lights up and creates the famous Aurora Australis. The energy of the solar wind acts on the thin gasses of the upper atmosphere and the light it produces corresponds to different gasses glowing in shades of yellow, green, blue and red.

The name "Aurora" comes from ancient Roman mythology. Aurora was the goddess of dawn. The Romans believed the Aurora to be a false dawn. Aurora Australis is a spectacular display of colour and light that must have led the Romans to believe the sun was rising. This must

have been what prompted them to have named the lights after Aurora.

The Aurora consists of rapidly shifting patches and dancing columns of light of various hues. Extensive Auroral displays are accompanied by disturbances in the terrestrial magnetism and interference with radio, telephone and telegraph transmission. The period of maximum and minimum intensity of the Aurora follows almost exactly that of the sunspot cycle, which is an eleven-year cycle.

The aurora assumes an endless variety of forms: the auroral arch, the auroral band, filaments and streamers at right angles; the corona (a circle near the zenith) and auroral clouds. Jupiter has similar occurrences.

The Southern Lights have been around for thousands of years, and they will be around for thousands more, but much of the uninhabited region of Antarctica still remains a mystery to many. The Southern Lights will dazzle spectators for generations to come. Whenever it is all figured out, and Aurora's secrets are in the past, her lights will not be. We will still be amazed by her lively shows put on in the evening for a select few that give up the time to watch and marvel at her spectacular southern lights.

*From a Paper by
Jamie Wright
Brandon High School
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May, 2001*

What IC This Month

Sept 16 – October 20, 2002

Quick Sky Tour

Constellations will parade from Virgo (far west), Libra, Scorpius, Sagittarius, Capricornus, Aquarius, Pisces, Aries, and Taurus will rise in the East about midnight this month.

The Earth is at spring equinox on 23/9 with day and night hours being equal.

The Last Quarter Moon will pass close to Saturn in the early morning on 29/9, the crescent Moon will approach Antares in Scorpius on 10/10, and 1st Quarter Moon will be near the handle of the teapot at midnight on 13/10.

Full Moon 21/9

Last Quarter Moon 29/9

Dark Moon 6/10

1st Quarter Moon 13/10

The Planets

Mercury is in Virgo and 12° above the western horizon for the next week. Then it will sink each day to disappear between the Sun and Earth by the 28/9. It will come back in the morning sky just before Sunrise. It will be highest from the Sun on 13/10.

Venus is in Libra and at its brightest on 29/9. This is really surprising because it is only showing a large crescent disk. How much brighter would it be if the disk were full? In September you will find it near Spica in the early evening.

Neptune is still in Capricornus shining at 7.8 mag just over 4° from theta (θ) Cap. If you run a straight line from iota (ι) Cap through θ and extend for 4.3° you should spot it. **Uranus** is just on the border of Aquarius, 4.4° from delta (δ) Cap to the east. Both of these planets are now past opposition and will be visible all night

Morning Sky

Saturn rises about 1 am and moves into Orion's territory after spending two years in Taurus. However retrograde motion will return it to Taurus in November.

Jupiter rises in Cancer just 45 minutes before dawn light. So if you are up at 4 am, look for it in the east.

Comet Brewington (P/1992 Q1) is 11th magnitude and less than 4° from M55 in Sagittarius late September. Have a look with a low power eyepiece and see if you can find it.

Portraits in the Sky

PEGASUS - The Flying Horse

Pegasus appeared from the neck of Medusa when Perseus cut off her head (refer back to What IC Nov. 2001). It was imprisoned till the Gorgon's death, after which Athene gave Pegasus to Bellerophon, to ride against the Chimaera - a female monster with three heads.

Bellerophon shot arrows at the beast as he flew above her and wedged a huge lump of lead between her jaws. The monster's own hot breath melted the lead, which flowed down her throat and burned her to death.

Bellerophon was the Bruce Willis of ancient times but after several successes against baddies he got a big head. Flushed with victory, he flew over Mount Olympus home of the gods, as if he too were immortal. To teach him a lesson Jupiter sent a gadfly to sting Pegasus on the rear end. Bellerophon was bucked off and he wandered blind, lame and shunned by man about the earth for the rest of his life. Pegasus went alone to Olympus, where he changed his name to 'Lightning' the carrier of thunderbolts for Jupiter.

Pegasus is easy to see and includes the so-called "**Great Square of Pegasus**". However the bottom right hand star of the square (*delta*) is shared with Andromeda, to provide a head for the lady!

Alpha (α) Pegasi is at the top left of the square and passed the meridian (was directly overhead) on 7 September. The stars are generally second and third magnitude. There are several interesting binaries, and one outstanding deep sky object.

Double stars in Pegasus:

Epsilon (ϵ) Pegasi (Enif near M15) should be a binocular object at magnitudes 2.4, 8.4, and 142" separation.

Kappa (κ) Pegasi is a very close binary of only 0.2" separation. However a C component is 142" away. At mag. 2.5/8.6, binoculars will get you AC, but you will need 200mm or more to get AB.

85 Pegasi (near Alpha Andromeda) is a well-known close binary with a 26-year orbit. Magnitude is 5.8, 8.9; and separation 0.8". However again there is a C component at 9th mag. which is 75" separation

Deep Sky Objects:

M15 (NGC 7078) is one of the finest globular clusters in the heavens, very bright and compact, at 35,000 to 40,000 light years away. Find it 4° NW of epsilon (ϵ) Pegasi.

Globular Cluster M15



NGC 7479 is a barred spiral galaxy about 3° due south of alpha Pegasi.

NGC 7331 is a spiral galaxy like looking at the Milky Way Galaxy from fifty million light years away.

Stephan's Quintet is a noted cluster of galaxies 1/2° SSW of NGC 7331. See how many of the five you can spot (three is average, four is good).

SCULPTOR – The Sculptor's Studio

Passing overhead at midnight on 6th October, Sculptor is one of those obscure constellations invented by Nicolas Louis de Lacaille to help fill in part of the southern sky. Its stars are generally fourth and fifth magnitude. The constellation has two binaries with very long orbits, and several spiral galaxies.

Double stars in Sculptor

Delta (δ) Sculptoris is a multiple system: AB: 4.6, 11.5; separation is only 4" so might be difficult to see. C is easier at 9.5, separation 75".

Epsilon (ϵ) Sculptoris is a slow moving binary with an orbit of about 1200 years: 5.4, 8.6, separation 4.7".

Kappa¹ (κ^1) Scl: 6.1, 6.2; separation 1.4". **Tau (τ) Scl** is another slow moving binary; it takes nearly 1900 years to make one revolution: 6.0, 7.1; separation 2.1".

Deep Sky Objects:

NGC 55 is a spiral galaxy, seen nearly edge-on. It's

located 12° southwest of **alpha (α) Scl**. The nearest star to this galaxy is alpha Phoenicis 3.5° southeast. This is a member of the so-called Sculptor Group, which is one of the nearest galaxy clusters to the Milky Way, at about 8 million light years.

NGC 253 is one of the easiest spiral galaxies to observe from Australia. Join the group of MAS fans who can't go past this bright spiral of the Sculptor Group. It is found 5° NNW of α Sculptoris. Just ask Dick Everett!



NGC253

The warm but short summer nights are coming. Make it your aim before year's end to join in a field night observing for a couple of hours.



NGC55

Good seeing IC

Ballad of Belanglo

There were murmurs in the forest
Belanglo was braced
The astronomers from MAS were on their way.
They had driven for an hour
Brought their sleeping bags and food,
The stars were out and MAS was bent to stay.

The wind whipped up the tree tops
As MAS set up all their scopes
John and Pete and Ian, Daniel too.
Dick and Lloyd and Bruce
Plus Ned with kids in tow
And Richard and Kalani (they were new.)

Bob arrived eventually
And set up in the wind
For want of spots protected by the hall.
Then Noel arrived and managed
To squeeze in with the crowd
Rank doth have its privileges, after all.

The cabin lights were reddened
The urn put on to boil
And bunks were 'baged' and made up for the night
Then eyes were turned to heaven
The stars were on parade
And all agreed it was marvellous sight.

The night was filled with wonders
Too numerous to name
Though some stick in the memories of those there,
But all agreed Belanglo,
That forest filled with shame
Provides a sky that's dark beyond compare.

Andromeda flaunted vainly
Flitting 'tween the trees
The Magellanics proved a glorious pair.
Cameras gobbled photons
And dobs swayed in the breeze
And 'go-tos' – well, like 'go-tos,' just went there.

It was getting two or three-ish
When most retired to their beds
But some true stalwarts said they'd hold their
ground.
And so it proved most fateful
When the sky burst into red
That someone with eyes open was around.

The shouts and yells and yahoos
Would have raised the dead,
It surely woke the sleeping and the snorer.
The word was spread quite loudly
"Get up and out of bed,
If you want to see a sight, a southern aurora."

Those who did were gobstruck,
Did someone somewhere start a war?
The southern sky was blazing, as on fire
And beams of white, like searchlights
Did probe the glow and soar
Oh, it truly was a sight fit to inspire.

Finally they staggered
Their way back into bed
To snatch what sleep they could before the dawn,
But the sleepless Pete, elated
Held his ground, he hadn't fled,
So was rewarded when the aurora was reborn.

The sleeping crew, at sunrise
Were awoken by a din.
The sleepless one had come to break his fast
His adrenalin was pumping
Despite his lack of sleep,
And he banged and talked in stereo simulcast.

"Shaddup!" the call came rudely
"Have mercy" said the rest
Their hope for sleep was slipping fast away
Then another joined the talker,
Oblivious at best,
And so began another glorious day.

There were murmurs in the forest,
Belanglo was sad.
The astronomers from MAS had slipped away.
But they'd left a store of memories
Of a sky that made them glad,
And promised they'd be back another day.

*



Ring 'a Ring a Galaxy

The picture below, being sadly in black & white, does not show this object in its beautiful colours.



But what is it? It looks like a globular cluster inside a planetary nebula, or an annular galaxy around a fuzzy elliptical galaxy.

In fact, it is one of the more famous of a new class of galaxies – the Ring galaxy.

The question of its nature was first asked when it was discovered by astronomer Art Hoag in 1950. On the outside is a ring dominated by bright blue stars, while near the centre lies a ball of much redder and older stars. Between the two is a gap that appears completely dark, but is suspected to contain some star cluster that are too faint to see.

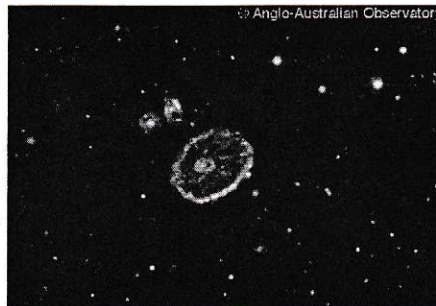
This object has been dubbed the Hoag Object, a ring galaxy. It is 120,000 light years across, and 600 million light years away in the constellation Serpens. This beautifully detailed photo, the

first of its kind, is courtesy of the Hubble's new camera.

If you look closely at around one o'clock just inside the ring, you will see another ring galaxy, even further away.

How do these ring galaxies form? The most popular theory is that it results from a collision of two galaxies. When galaxies collide, they pass through each other, their individual stars rarely coming into contact. The galaxies' gravitational fields, however, may be greatly distorted by the collision. If one galaxy is smaller than the other and passes right through it, the distorted gravitational fields would compress the interstellar gas and dust, causing a wave of star formation to move out from the impact point like a ripple across the surface of a pond.

Such a thing is suspected to have caused the familiar Cartwheel Galaxy, shown below.

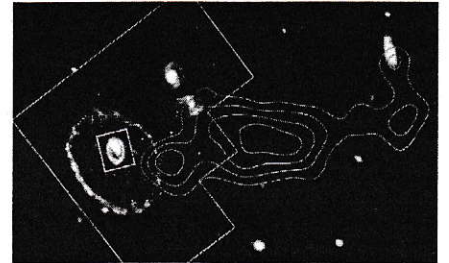


In this case, the large galaxy may have been a spiral like our Milky Way and was transformed by the collision with a smaller intruder.

But what happened to the intruder galaxy?

Astronomy detectives have finally got the fleeing intruder in their sights, using multi-wavelength surveillance.

The evidence of the reckless hit-and-run is shown below:



A composite picture showing a visual image of the Cartwheel Galaxy and smaller galaxies of the Cartwheel group, superimposed with high resolution radio observations of neutral hydrogen, shown as contour lines. The neutral hydrogen trail suggestively leads to the culprit galaxy at the far right, near the top. It is presently approximately 250,000 light years distant from the Cartwheel, which is itself about 100,000 light years diameter.

This image, plus the suspicion that there are plenty more Ring Galaxies out there to be identified, reinforces the theme that just as you think astronomers are beginning to supply all the answers, more questions and even stranger objects keep showing up.

Ain't astronomy marvellous!