

# Night Sky

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## TYCHO BRAHE, last of the visual observers



Mike Smith

### ONE OF THE GREAT FIGURES IN ASTRONOMY LAID TO REST (YET AGAIN) IN PRAGUE WHERE HE SPENT HIS LAST YEARS MEASURING THE UNIVERSE.

Tycho Brahe was born in 1546 into a wealthy noble family in Scania, which was then a part of Denmark but is now in Sweden.

He was raised by his uncle and attended school where lessons were taken in Latin. At twelve he began studies in law at the University of Copenhagen. He also studied a variety of other subjects and became interested in the precision of astronomy after seeing a solar eclipse that had been predicted mathematically.

While studying at University of Rostock in Germany, in 1566 Tycho lost the bridge of his nose in a sword duel with fellow Danish nobleman Manderup Parsbjerg. They had apparently been quarrelling at a party. As a result he wore a prosthetic nose for the rest of his life. It was claimed that they were made of silver or gold but green marks noticed on his skull during the 1901 exhumation would indicate that he also wore one of copper.

His interest in astronomy grew and he became convinced through careful measurements of the sky and that objects, such as comets and supernovae were well beyond the reach of the solar system. This had to mean that the universe was not the unchanging and perfect arrangement of spheres believed since the days of Ptolemy and Aristotle.

Tycho Brahe was granted an estate on the island of Hven and the funding to build a research institute which he called Uraniborg. He built large astronomical instruments and improved and enlarged existing instruments, and built entirely new ones. His sister Sophia assisted Tycho in many of his measurements. They took many careful measurements of the positions of stars and planets. He even found the time to set up a paper-making factory to print the results of his endeavours.

After a disagreement with the Danish king in 1597, he was invited by Emperor Rudolph II to go to Prague, where he became the official imperial astronomer. He built a new observatory at Benátky nad Jizerou. Here he was assisted by Johannes Kepler who later used Tycho's astronomical results to develop his own theories of astronomy.

Tycho worked to combine what he saw as the geometrical benefits of the Copernican system with the philosophical benefits of the Ptolemaic system into his own model of the universe. He was the last of the major naked-eye astronomers. His work was done without the yet-to-be-invented telescope. Nobody before Tycho had made so many planetary observations. Tycho is credited with the most accurate astronomical observations of his time and the data from his multitude of observations were used later by Kepler to derive his laws of planetary motion.

In 1571, Tycho had fallen in love with a commoner, and never formally married her. However, under Danish law such a morganatic marriage becomes legal after three years, though the wife and any children retain commoner status. Together they had eight children. Kirsten and Tycho lived together for almost thirty years until Tycho's death.

According to Kepler, Tycho refused to leave a banquet in honour of the Emperor to relieve himself because it would have been a breach of etiquette. As a result he apparently contracted a bladder or kidney ailment and died in great pain eleven days later, on 24 October 1601. Before dying, he urged Kepler to finish his work on astronomical tables. A contemporary physician attributed his death to a kidney stone, but no kidney stones were found during an autopsy performed after his body was exhumed in 1901. There have always been theories put forward that he was poisoned, but not unsurprisingly, no proof has ever been produced.

His body was again exhumed in 2010 after a request from Danish scientists from Aarhus University who arrived in November to take bone, hair and clothing samples for analysis. It was suggested to me (in September 2011) by people in Prague that preliminary results showed that there were excessive amounts of mercury in his remains. This could possibly confirm the theory held by some that he may have been poisoned at the wishes of authorities in Denmark. Final results of the examination should be known shortly. In the meantime we can only hope that poor old Tycho Brahe can be left in peace... once again. *Mike Smith*



Mike Smith

A recent outburst by credit card operators claimed that evil retailers were sneaking in excessive charges to customers when sales were made by credit card. This, from operators who themselves routinely charge customers over twenty percent p.a. for outstanding amounts is a bit rich. Most retailers do not charge customers for using credit cards. Corporate credit cards may attract a small charge because card operators charge the retailer a considerably higher rate for accepting them.

\* \* \*

Having just arrive back in Oz from a trip to the Mediterranean I can appreciate once again just how much clearer and more interesting our skies are. Even in the middle of the Mediterranean, away from cities and light pollution the skies were duller and with less stars visible than we're used to seeing. My visit to that part of the globe was an attempt to assist the economies of several countries in the region. It is also part of the reason this issue of Night Sky is running late. My apologies!

\* \* \*

I've visited quite a number of optical establishments over the years. My hat's off to the people at Swarovski's binocular factory in Austria. I have never seen such precision and meticulous attention to detail. The calm atmosphere in which binocular and spotting scope parts are manufactured and then painstakingly assembled with extraordinary precision was an eye-opener. Just imagine; if they made a few astronomical refractors. With their expertise and precision manufacturing capability,, together with their mastery of high quality optics... hmmm!

\* \* \*

So, the speed of light has been broken! But has it? If we could actually travel through time I wonder what we'd do. Who would we visit... what historic event would we watch...? If we killed our own grandfathers we'd never exist... but we couldn't do in ole granpappy. Whatever! Great stuff for science fiction writers and film makers!

\* \* \*

My visit to Europe included Prague and Dubrovnik. What beautiful cities they are!



### MEADE ANNOUNCES A RANGE OF NEW TELESCOPES

Meade's LX800 system uses a faster f/8 Advance Coma-Free optical system and will be available in 10", 12" and 14" apertures.

Unique features include an internal Crayford-style, zero-image-shift focusing system with a two-speed 7:1 control. A three-element f/5 focal reducer/field flattener is available as an option. This delivers wider fields, faster exposures and a photographically flat field even with larger image sensors.

Also available will be a Series 6000 130mm three-element air-space apochromatic refractor.

The LX800 equatorial mount also incorporates a full-time automatic guiding system, the all new StarLock technology which incorporates an 80mm f/5 optic operating in tandem with a super wide-angle lens creates a two camera system that automatically finds your target with high precision. *More overleaf....*

IN THIS ISSUE

Mel goes all hippy on us .....	2
Meade up with new products .....	2
Star Map for October.....	3
Mick 'n Don .....	4

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# MEADE'S NEW STUFF RELEASED

- \* heavy duty equatorial mount
- \* f8 cassegrain optical systems
- \* integrated automated guider
- \* alt-azimuth/equatorial system



The Meade fast f/8 Advanced Coma-Free (ACF) optical systems are available on the 10", 12" and 14" telescopes. Internal Crayford-style primary mirror focusing system with a dual speed 7:1 focus control eliminates image shift and mirror shift. Precise focus is assured. These optics produce wider, flatter fields with no coma for pinpoint stars out to the edge of larger imaging sensors or extreme wide angle eyepieces. An optional custom-designed LX800 f/5 large-format focal reducer/field flattener is available. Alternatively: A 130mm 3-element, air-spaced apochromatic f/7 refractor with 3" Crayford-style 10:1 focuser. Beautifully machined and finished with care. Optional 3" field flattener is also available.

The **StarLock** full-time automatic integrated guider assists with ultra-precise drift polar alignment, finds and centers targets and then automatically locks onto a field star as faint as 11th magnitude for one-arcsecond guiding. No separate computer, no guide star selection, no user focus is necessary. Just set up the camera and begin imaging.

The German Equatorial Mount is made from machined aluminum and stainless steel with large bearing surfaces and roller bearings in both axes for an extremely solid and stable platform.

#### Further features:

Internal cabling to prevent snags and tangles during imaging sessions. Precision machined 5.8" main gears with 225 teeth in both R.A. and DEC for very accurate movements and tracking.

1.75" diameter threaded stainless steel counterweight shaft with 9kg threaded stainless steel counterweight for easy and safe adjustments to telescope balance.

Sophisticated built-in computer for the most accurate control of the StarLock and other telescope systems.

AutoStar II hand control with over 144,000 object database to locate almost any object imaginable at the push of the GoTo button. AutoStar II allows the user to setup and operate the LX800 in just the way you want.

Ultra-stable adjustable height tripod. Three inch diameter legs fold up for easy transport.

Accessories include 8x50 viewfinder, Series 5000 2" enhanced 99% reflective diagonal and a 25mm HD-60 premium eyepiece.

These telescopes will begin to be available around the Christmas-New Year period. Meade's LX80 is a new mount that can be used as an Alt-Azimuth mount or as an Equatorial mount. The mount is supplied as standard with a Vixen-style dovetail OTA mounting that provides compatibility with many different OTAs.

The heavy-duty mount is a rock-solid, stable platform with precision worm gear drives on both axes for both visual and astrophotography requirements.

The innovative sectional counterweight shaft allows the ideal shaft length to be set for counterbalancing or dual-tube configurations.

Multi-mount adjustment allows for simple change between alt-az mode and German Equatorial mode.

The control panel includes power connector, handbox port and two auxiliary ports for connecting optional equipment.

Meade's revolutionary Audiostar computer-control handbox finds and points your telescope to over 30,000 objects in the night sky. With its 'Astronomer Inside' digital audio technology, everyone around the telescope can listen and learn about the 500-plus celestial objects contained in its database of planets, nebulae, star clusters, the Moon and much more.

Fine-tune tripod adjusters allow you to quickly and easily level the heavy-duty stainless steel tripod for optimum pointing accuracy.

*Available soon!*

## THE SPEED OF LIGHT HAS BEEN BROKEN... OR HAS IT? (WHAT ABOUT THE GRANDFATHER CLAUSE?)

CERN, the European Organization for Nuclear Research has just measured subatomic particles traveling at faster than the speed of light! Or, in non-English: CERN has just measured a neutrino (that's a subatomic particle to you) that traveled from Geneva, Switzerland, to a destination in Italy and managed to exceed the speed of light by 60 nanoseconds — with a margin of error of only 10 nanoseconds. "Something exceeds the speed limit in Italy, and somehow this is news?"

If true, this is huge. The idea that the speed of light is a constant, never to be exceeded, has been fixed since the time of Albert Einstein. It's one of those operating assumptions that underlie our every action, like "single men with cats are bad marriage material", "Christmas calories don't count," Up is up, down is down and the speed of light cannot be broken.

It will force us to rethink all our scientific assumptions. The speed of light was supposed to be an absolute limit, like the age of consent, not a guideline, like the drinking age. Science is wrong. "The Big Bang Theory" will have to go off the air in shame. But on the bright side, now maybe we can visit Tatooine after all! We just discovered it. At the rate we're going this week, "Star Wars" will turn out to be a documentary. Still, if true, this is huge. It undermines everything we've thought since 1905. We'll have to rethink all our other assumptions. Maybe we don't need coffee to survive. Maybe shark attacks aren't more relevant to our lives than car crashes. Maybe we should trust Greeks bearing gifts.

I've had so many of my assumptions unsettled that I have this intense urge to become a Scientologist.

It's too much. Next time we see a particle do that, somebody ought to pull it over.

*with thanks to Alexandra Petri*

## LOOKING SOUTH with Mel

### MEL GOES HIPPI AND WRITES TO US OF THE AGE OF AQUARIUS... PEACE!



Spring seems to have certainly sprung as I sit here writing this. The warm weather means that nights are not as cold so now is the time to get out and enjoy the last of the winter constellations as well as some of the fainter Spring constellations. One of the fainter and most ancient constellations in the sky is Aquarius. Currently the Sun is in Aquarius from late February to early March, however in the future Aquarius will one day contain the vernal equinox (the point when the Sun crosses into the northern hemisphere each year). This will not occur until AD 2597 when the point will move from Pisces to Aquarius. Astronomically, this is very important as the right ascension coordinate measurements are taken from this point.

Aquarius is one of the few constellations that has carried a consistent mythical theme across different cultures. To the Greeks, the constellation represented Ganymede, a young shepherd who was carried off by Zeus to be the wine-waiter to the gods. The Babylonians saw a man pouring water from a jar and the Egyptians saw the figure as Hapi, the god of the Nile, his urn symbolising good fortune.

Aquarius mostly consists of relatively faint stars, with its brightest star magnitude 2.9, thus making the constellation harder to see in light polluted skies. However, Aquarius has some dazzling sights:

Alpha (α) Aquarii and Beta (β) Aquarii are both yellow supergiant stars, both shining at magnitude 2.9.

Zeta (ζ) Aquarii is a well-known binary consisting of 2 white stars at magnitudes 4.3 and 4.5. Their orbital period is 760 years and currently they are moving apart, thus making them an easy target for small telescopes.

M72 is a globular cluster. However at 9th magnitude and at a distance of about 56,000 light years, a medium aperture telescope is required to resolve detail. NGC 7293 (Helix Nebula) is the closest planetary nebula to our Sun. The Helix covers about a 1/4 degree of the sky, thus making it the largest planetary in apparent size. However it is fairly diffuse and can be hard to pick up and is best seen in a telescope using a low powered eyepiece, where it appears as a circular misty patch. In recent years Hubble Space telescope has taken close-ups of the inner disk of the Helix, revealing small knots of molecular gas dubbed "cometary knots" due to their appearance.

M2 is a globular cluster approximately 37,000 light years away. At a magnitude of 6.5, it can be easily seen in small telescopes, however to resolve the brighter stars a telescope of 100mm or more is required.

NGC 7009 (the Saturn Nebula) is a planetary nebula lying about 3,000 light years away. It resembles the planet Saturn when viewed through large aperture telescopes. At 8th magnitude, it appears as a blue/green ellipse and can be seen in telescopes 75mm or greater. In recent years, this planetary nebula has been imaged by the Hubble Space Telescope revealing structure and detail impossible to see from Earth based telescopes.

Make the most of the warmer weather this October and enjoy some of the spring delights of our Universe!

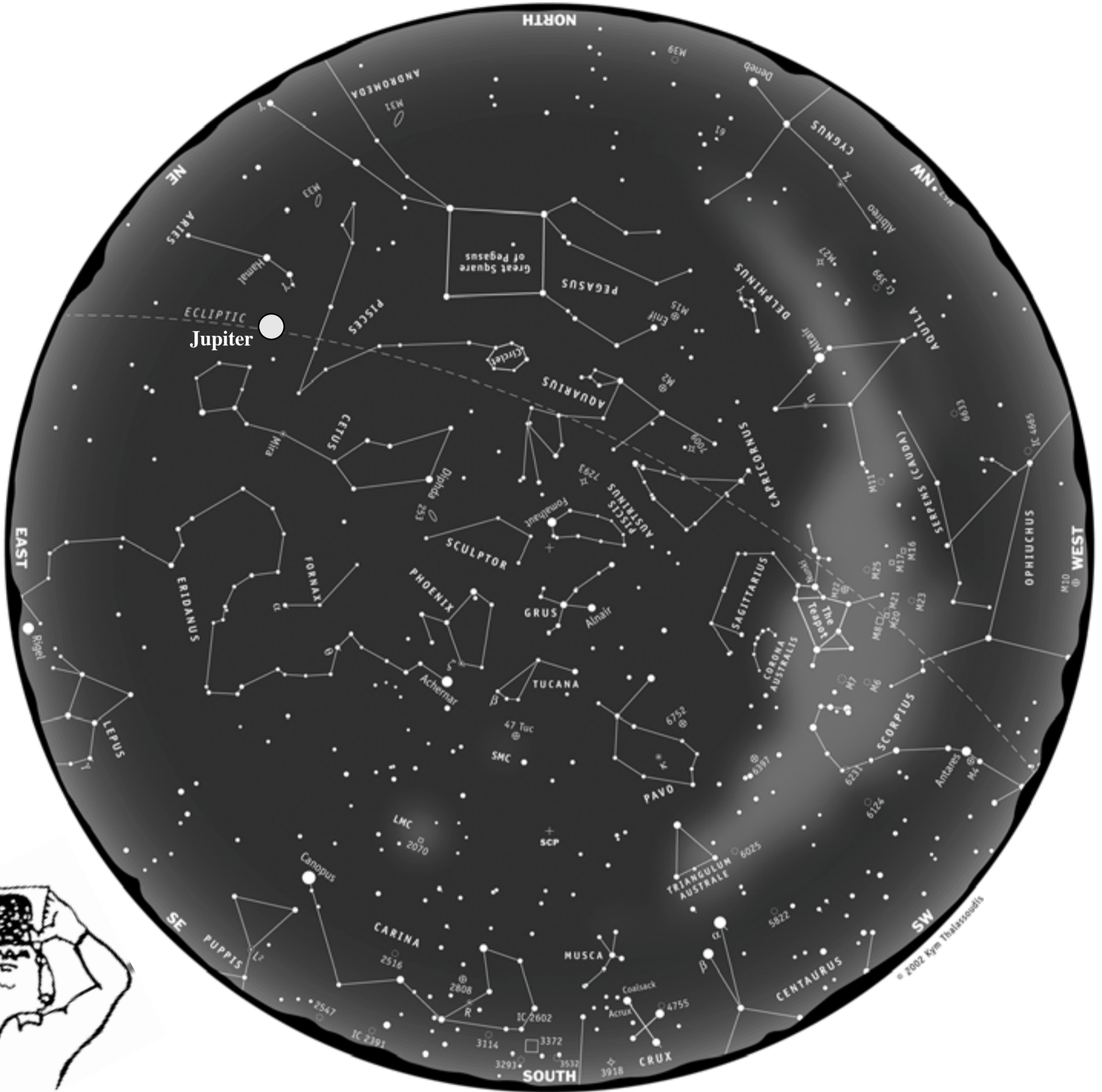


## CHECK OUT THE ORION METEOR SHOWER says Mel

October also sees the return of the annual Orionids meteor shower. Interestingly, this shower was first recorded in 288AD by Chinese astronomers. Meteor showers are caused when the Earth crosses the orbit of a comet and encounters a trail of debris and dust left by the comet. Certain meteor showers can be attributed to particular comets and the Orionids are associated with Halley's Comet. Most meteors are best seen after midnight, with the Orionids being no exception. The shower is active from October 2 until November 11.

Maximum number of meteors should occur on October 22, however, the Orionids also experiences many sub-maximums that occur around this date and this combined with the fact that the last two decades have produced good rates of between 14-31 meteors an hour means that observations of this shower should certainly be worth the effort. The Orionids are usually bright and swift moving (approx. 66 km/s) with many leaving trains. Look towards the East after midnight for Orion, make yourself comfortable and warm... and wait for the show!

You can shop on-line at [www.bintel.com.au](http://www.bintel.com.au) for your astronomical needs.



Evening sky October 2011

### The Moon

The Moon's orbit around the Earth seems stable but it is actually drifting away from us at a rate of about half a metre every ten years. In about 50 billion years the Moon will settle into a stable orbit, taking about 47 days to go around the Earth. The Earth and the Moon will be tidally locked to each other. The Sun is expected to fry the Earth in about five billion years, so there's not much point in waiting for the Moon to settle down... it may never happen.

- 4<sup>th</sup> First Quarter.
- 12<sup>th</sup> Full Moon
- 12<sup>th</sup> Moon at Apogee
- 20<sup>th</sup> Last Quarter
- 26<sup>th</sup> Moon at Perigee
- 27<sup>th</sup> New Moon



### The Solar System

**Mercury:** Is now in the evening sky and moves slowly nearer to Venus as the month progresses.

**Venus:** Low in the west and moves into Libra. Mercury makes a reasonably close approach. Watch for the Moon to scrape above on the 28th.

**Mars:** Mars tiptoes through the Beehive Cluster in Cancer before heading off towards Leo late in the month.

**Jupiter:** Jupiter is rising early in the evening and is at opposition on the 29th. High in the north-eastern sky, it's easy to see. A great sight!

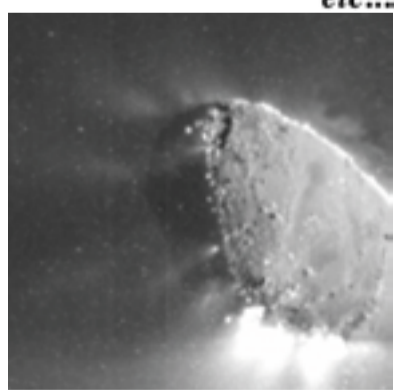
**Saturn:** Saturn is on the opposite side of the Sun at the moment and won't be visible till November, when it will re-appear in the dawn skies.

**Uranus:** Uranus is just beyond visual observation. You'll need binocs at least and a good star map with Pisces in it.

**Neptune:** Neptune is in Aquarius and rises at about 7pm in the eastern sky. Well beyond visual range at Mag 8, you'll need a good scope to see it.

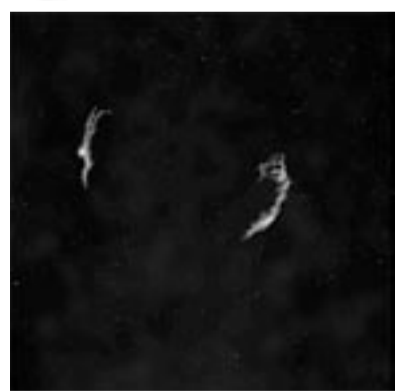
**Pluto:** Pluto fell asleep as the Great Leader explained why we need tax reform. He believes that the Greeks have got it figured. Just don't pay any tax! You get someone else to pay all the bills for you. A wonderful idea from the people who invented cynicism.

### Comets etc...



The latest analysis of data from NASA's Deep Impact spacecraft shows that comet 103P/Hartley 2 is hyperactive in terms of the material it spews out, compared to other comets observed up-close to date. In addition, one lobe of the comet may have lost much more material since its formation. It also has large amounts of water ice. *See elsewhere for more info.*

### Deep Sky



If you have a clear northern horizon it might be fun to locate the Veil Nebula. It's visible about twenty-five to thirty degrees above the horizon and can be seen in binoculars. The western half (NGC6960) is fainter than the eastern half (NGC69) of this supernova remnant. The sight in a large reflector, aided by a nebula filter is something to behold! Well worth the effort.

# ASTRO societies

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- Sutherland Astronomical Society Inc: NSW**  
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- Northern Sydney Astronomical Society Inc:**  
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http://www.aswa.info  
☎ (08) 9364 9603
- Astronomical Society of The South-West, W.A.**  
☎ (08) 9721 1586 Phil Smith.

# COONABARABRAN SCIENCE-IN-THE-PUB



"Hey Bruce, will the Universe end with a bang or a whimper?"  
"Dunno Trevor, but it's thirsty work thinkin' about it, though."

This entertaining event starts the weekend off on Friday October 14th, 2011 from 6.30pm. This annual debate is definitely entertaining and can be thoroughly outrageous at times as a group of astronomers from various backgrounds debate a topic of astronomical interest at the Royal Hotel, John Street Coonabarabran. This event has an entry fee of \$5 and provides entry into the drawer for a variety of prizes on the night. Food is available for sale on the night. Bookings would be appreciated. Vegetarian meals are also available. The topic this year is "Life, The Universe and Everything - Is there Anybody out there?" This year's participants are Prof Charlie Lineweaver & Dr Daniel Bayliss (ANU), and Dr Simon O'Toole (AAO) Comper will be Sally Bryant from ABC Western Plains.

On Saturday October 15th, the Annual Siding Spring Open Day will be held at Siding Spring Observatory - when they will open a number of secret rooms where the aliens are kept locked up. You will also be able to look over the big telescopes during the day. There will be a BBQ lunch available, a shuttle bus on site to help you move around and see all there is to see - a chance to talk to real astronomers and learn about what they do there. Solar observing will also be available and there will be talks in the Exploratory lecture theatre throughout the day. The Exploratory cafe will be opened for a well-deserved cuppa or Devonshire tea and entry to the event is free. The Open Day will start at 10 am and run until 4pm. Visit the various telescopes and listen to astronomers talk about the research they do. On Saturday October 15th, the Annual Siding Spring Open Day will be held here at Siding Spring Observatory - where we open a number of the telescopes during the day to the public - there will be a BBQ lunch available, a shuttle bus on site to help you move around and see all there is to see - a chance to talk to astronomers and learn about what we do here. Solar observing will also be available and there will be talks in the Exploratory lecture theatre throughout the day. The Exploratory cafe will be opened for a well deserved cuppa or Devonshire tea and entry to the event is free. The Open Day will start at 10 am and run until 4pm. Visit the various telescopes and listen to astronomers talk about the research they do.



# THIS IS THE MONTH OF AQUARIUS SAYS MEL,,, BUT OTHERS THINK IT'S THE AGE OF AQUARIUS !

When the Moon is in the seventh house and Jupiter aligns with Mars. Then peace will guide the planets and love will steer the stars. (Eh? Isn't this a line from a song from a stage play called 'Hair' Ed.)

At dawn on 14th February the Cosmos actually embodies this perfect alignment to support our collective manifestation of love and peace and dawning of the Age of Aquarius.

The Aquarian chart of 14th February reveals an incredible concentration of cosmic influences blending with the energies of Aquarius in the twelfth house. Expansive Jupiter and energetic Mars are aligned with the higher purpose of the North Node.

The presence of Chiron the wounded healer offers us the opportunity to heal the schisms that have separated us for so long. And instead of the North Node (higher purpose) being aligned with Jupiter and Mars as it was in 2009, it was in opposition. What this means is that back in 1962 it was the so-called south node rather than the north node that was aligned with Jupiter and Mars.

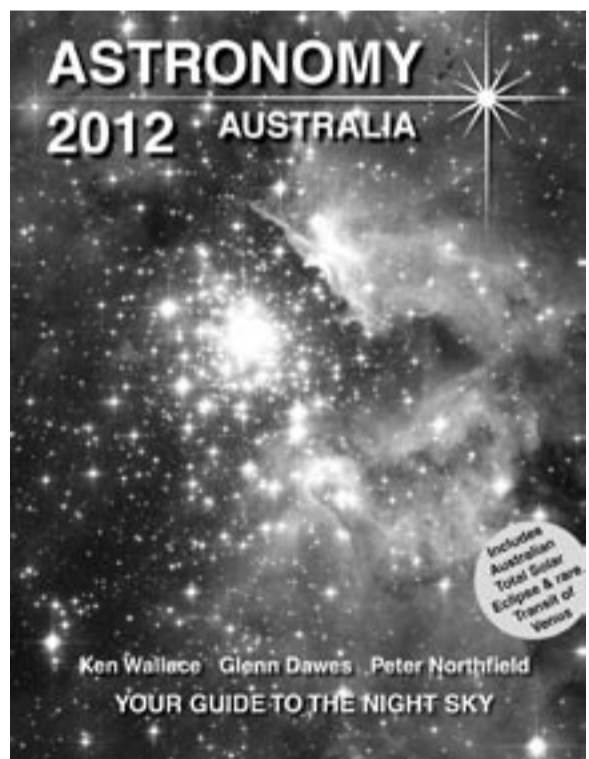
We are moving through this monumental year of change at warp speed. We are receiving incredible assistance from On High through the synchronicity of both Global and Universal Activities of Light.

Neptune emphasizes collective humanitarian movements and the co-creation of social justice. And the presence of the radiant Sun enlightens the entire alignment. Mercury also in the twelfth house but just beyond the cusp in Capricorn, allies with transformational Pluto to communicate and anchor the Shift throughout our global structures and institutions.

The above comments, much copied and re-copied from one 'New Age' website to the next are hard to pin down to an original author, so no attribution. Chase it up yourself.

So, when will The Age of Aquarius REALLY begin? In about five hundred and ninety years... give or take two or three.

# ASTRONOMY 2012



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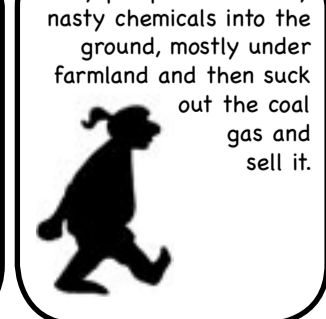
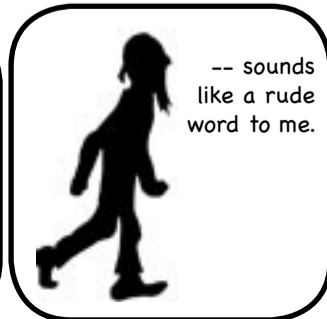
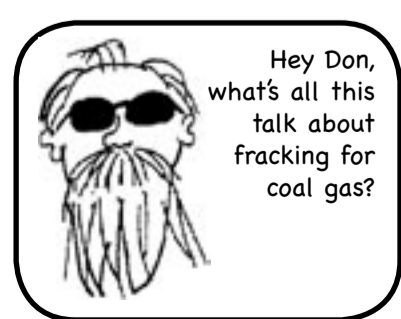
# Nervo Shatterini September Quiz

His Eminence Professor Dr Nervo Shatterini, Professor in Planetary Paraboloidal Physics and Subcutaneous Ephemerides and ex-Director of the Damelian Academy of Fastcarology craves your attention. Please answer these questions.

- (1) How far away is the Large Magellanic Galaxy?
- (2) Does Jupiter have a magnetic field?
- (3) Whose hair contains lots of stars?
- (4) Why did William Pickering upset Percival Lowell?
- (5) Which New Guinea denizen is listed as a constellation?
- (6) Is Stephan's Quintet a musical group?
- (7) In which constellation is the Vernal Equinox?
- (8) A meteorite made of pyroxene comes from where?
- (9) Which is the faintest constellation?
- (10) What is the common name of M11?
- (11) Which well-known star is a Yellow Dwarf?
- (12) What are the two types of glass commonly used in lenses.
- (13) What is the Clown-face Nebula more commonly called?
- (14) Who sang "Friday on my mind"?
- (15) What sort of music does the Grus Quartet play?
- (16) What is the Black Widow Pulsar?
- (17) Where is Utopia Planitia?
- (18) In which constellation is the Butterfly Cluster?
- (19) What was the diameter of Newton's first reflector telescope?
- (20) Which terrestrial planet has two captured asteroids as moons?

- (20) Mars.
- Yes, just 3.1cm!
- (19) It was 3.1centimetres across.
- (18) It's in Scorpius.
- Mars.
- (17) It's a huge plain on planet Mars.
- (16) A truly weird binary pulsar course!
- In Grus play Celestial Music of course!
- (15) These four spiral galaxies (14) The Easybeats 2392)
- (13) The Eskimo Nebula (NGC 12) Crown and flint glass.
- (11) The Sun.
- ter.
- (10) It's called the Wild Duck Cluster.
- (9) Sextans, the poor little runt.
- (8) Believed to come from Vesta, was there 2000 years ago)
- (7) It's in Pisces, not in Aries. (it five galaxies.
- (6) No, it's a disturbed cluster of no canals.
- (5) Apus, the bird of paradise on canals.
- (4) His photographs of Mars showed (3) Berenice
- (2) Yes. A very powerful one.
- (1) 170,000 light years

# Mick 'n Don



**Night Sky**  
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