



### Society News

*The following is an edited version of the minutes from the Annual General Meeting held on Friday, 24th August 2007 at Newport Parish Centre, Town Lane, Newport:*

2006/7 has been another good year for the Society with membership remaining strong at 135 paid-up members. The lecture programme has been good and well attended, particularly those opened up to non-members. The New Zenith has maintained its high quality content and with the option for members to receive it by email, this has saved on postage costs.

The Chairman reported that the Observatory is going from strength to strength with more use being made of the facility, particularly on Thursday evenings. Events at the Observatory have been very popular throughout the year, well publicised and consequently attracting many visitors.

*Officers elected:* Chairman, Dr Lucy Rogers; Secretary, Mrs Sue Curd and Treasurer, Mr Graham Osborne.

*Committee members elected:* John Langley, Bert Paice, Roger Hayward, Richard Flux, Roger Young, Brian Curd, Bert Buckett, Bill Johnston and Tony Plucknett.

The Chairman thanked all those who have served on the committee during his 7 years as Chairman. He particularly thanked John Langley for his work on the New Zenith which is now recognised as being amongst the best Astronomical Society Newsletters published. He also gave thanks to John Smith, who having served in many officer posts and having been a founder member of the of the Society, has made an immense contribution towards the Society. Both John Langley and John Smith received much applause for their services.



Spitzer Telescope - Helix Nebula, NGC 7293, NGC7293

**VAS Website:** [www.vectis-astro.org.uk](http://www.vectis-astro.org.uk)

Submissions to New Zenith are always welcome and should be sent to:

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Material for the next issue by the 6th of the month please.

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## From Our New Chairman

Hello! When I joined Vectis Astronomical Society I was impressed. An observatory with more equipment than many small shops, an interesting lecture programme, brilliant secondary talks each month by Peter Burgess and, to cap it all, it's all on an island where dark skies are common and well protected.



It is an honour to be elected chairman to such a large and successful Society and I would like to thank all those who have been involved in making the VAS such a success since it started over thirty years ago. Particular thanks must go to those who are now leaving the committee, although I hope they will remain active members of the Society. These include Tom Watson, John Smith, and Barry Bates. I'd also like to thank John Langley, who, although remaining on the committee as the Director of Astronomical Services, is passing the editorship of our newsletter, *New Zenith*, to Brian Curd. I'd therefore also like to thank Brian for undertaking this role, and also Sue Curd, for taking up the role of Secretary. Thanks also to Graham Osborne, our Treasurer, and all the other committee members who agreed to stay on and help keep the Society running smoothly. I know a lot of work goes on behind the scenes and their efforts are appreciated.

As Tom mentioned in a previous *New Zenith*, with so many members in the Society, we have a wide range of individual knowledge and we must try to ensure that there is something for everyone in the activities of the Society. We already have facilities at the observatory for visual astronomy, digital imaging, solar and radio astronomy, and everyone is welcome to come down on a Thursday evening to learn about or use these facilities, (or to teach us a thing or two) and to discuss problems, ideas or anything else astronomical with like minded people.

Our lectures in Newport allow us to hear not only about new developments and theories such as Dark Matter or Cosmology, but also about historical figures and events, such as Robert Hooke or the development of the calendar.

The Society is a part of our island community, and events such as our public lectures, observatory visits by schools and community groups, as well as our taking telescopes out to the public for sidewalk astronomy events, displays and school visits are, I hope, of benefit to everyone.

If anyone has any comments, ideas or suggestions for the Society or wants to become more involved in what we are doing, please let any member of the committee or me know - *Clear Skies*

*Lucy Rogers*

## From the Observatory

We have had a lot of visitors over the summer, mostly thanks to Paul England at the Island Planetarium who lets his visitors know about the observatory and our meetings every Thursday. Although there has been a lot of cloud, we have seen various satellites go over, including the International Space Station and the Space Shuttle, and also had good views of Jupiter. We have also used the solar scope and new radio telescope.

A group from the observatory visited the Island Planetarium in August, as Paul England is interested in using some astronomical photos taken from the island in some of his shows. This is now being taken further.

In the observatory a data projector has been permanently installed, thanks to Bill Johnston. Images, DVD's and presentations can now be easily shown to visitors and members, without trailing cables becoming a hazard. The hand controller on the observatory's 12 inch Meade telescope has now been repaired, and should provide easier use and control of the telescope.

Thanks to Bill Johnston and Jerry Green for making and setting up the new radio telescope at the observatory. Any member wishing to use this either at the observatory or at their own home, should come along to the observatory and talk to either Bill or Roger Hayward.

We are now preparing for the Sputnik Party on 4,5,6th October, so for a while the observatory will have a rocket theme. If anyone has any rocket information or memories, or astrophotos they would like to display on the observatory notice boards, we would be happy to see them.

The nights are now drawing in quite quickly, and instead of being light and cloudy, as it has been most of the summer, it is now dark and cloudy. If anyone would like to come along to the observatory, there is usually a group there every Thursday from 7:30 till late.

*Roger Hayward*

## From the Editor

Taking on something new is always a challenge and that is all the greater when you are new to the subject.

Enter me! Brian, to the position of editor. While I have the qualifications and facilities to produce a magazine, I have little of the astronomical knowledge. I'm on a steep learning curve and will be reliant on members to build on John's work and continue to make the NZ a worthwhile publication. Work is underway to standardise the look of *New Zenith* and to use the same artwork here as that on the website... *watch this space!*

*Brian Curd*

## 50 years of the Lovell Telescope

### *Prof. Ian Morison*

On Sat 25th August at the Newchurch Parish Sports and Community Association (NPS & CA) Pavilion by the Observatory in Watery Lane, the VAS welcomed Professor Ian Morison to speak on the 50 years of the Lovell radio telescope at Jodrell Bank, Cheshire, to an attentive crowd.

The event began at 6pm with solar scopes and our own Radio telescope on show and in use. An American supper produced a good spread and everyone tucked in to good food and varied conversations.

A head count of the crowd showed 30 souls of which 20 were club members and the other 10 a mix of Hooke Society, Institute of Mechanical Engineers, a County Press reporter and members of the general public who had seen the event advertised in the paper.

After tours of the VAS Observatory and a few cream cakes the talk began. Ian Morison is currently the Gresham Professor of Astronomy, and also the Operations Director for Jodrell Bank Radio Observatory. He has worked at Jodrell for all but the first few years of the telescope's operations, so he was able to pepper his talk with many personal anecdotes to illustrate the early years of the telescopes existence. He also described the effects of military interference and suspected espionage and also Jodrell Bank's role in the cold war.

The talk gave a history of Sir Bernard Lovell's involvement with wartime radar and demonstrated how that early work led him, once he returned to Manchester University, to try and identify strange traces which were thought to be Cosmic rays, using a war surplus gunnery radar set. As there was so much interference from trams going through Manchester city centre, he set up his equipment at the University's Botanical grounds 20 miles south of Manchester. The system was operating by December 1945, and his team proved that the traces were not caused by cosmic rays, but by ionized meteor trails.

The development of more ambitious aerials were detailed and many films and photographs of the building of the 250 foot diameter Mark 1 telescope, completed in 1957, and its later upgrade to the MK1a telescope were shown.

The projects that the telescope has been involved in were detailed in chronological order, starting with Sputnik and ICBM detection and NASA missions, moving through the meat of the talk consisting of its contribution to the discovery of Quasars, pulsar detection and observation, mapping the hydrogen distribution in the Milky Way and also the shape of the galaxy, and the use of gravity lensing to identify distant Quasars. Professor Morison also



*Prof. Morison with the VAS Radio Telescope*

described how Jodrell Bank observatory is used to measure the speed of the universe expansion and in the search for Dark Matter and Dark Energy. Upgrades of the Lovell telescope since its first use were also described and its continued involvement with the large arrays of Merlin and the VLBI has enabled it to match the resolution of the Hubble Space telescope.

Professor Ian Morison ended his talk with a look at what the future holds for the great instrument. An upgrade to an array called e-Merlin predicts an upgrade to resolution of nearly 30 times the current Merlin level.

The meeting finished at dusk and as the evening was clear and cloudless many people stayed on to use the observatory telescopes. It was a very successful evening, and the entry fee of three pounds a head covered the expenses involved. Hopefully it was of interest to enough new people to induct a few new members.

<http://www.jb.man.ac.uk/>

*Bill Johnston*

#### **We'd really like to hear from you!**

As well as publishing articles from our regular contributors, we would love to hear from you if you have an article you'd like to share with others.

So, if you've:

Built your own equipment

Developed a special technique

Taken a great photograph

Why not tell us about it by writing an article for NZ?

Submissions to [brian@briancurd.com](mailto:brian@briancurd.com) or

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## This Month's Night Sky

### Moon Phases

On the 26th the moon will be at its closest to the Earth for 2007. Coincidentally this is also the date of the full moon, making this the largest full moon of the year.

New	1st Quarter	Full	Last Quarter
11th	19th	26th	3rd

### The Planets

**Mercury** is still poorly placed but starts an excellent morning apparition right at the end of the month.

**Venus** reaches its peak in altitude around the 28th whilst in Leo. It still has Saturn in tow but soon they will part company, with Venus heading back toward the horizon and Saturn maintaining its steady path away from the sun.

On the 7th at 05h Venus is 3° south of the crescent moon and on the 14th at 08h lies 3° south of Saturn - the closest these two planets come this year.

**Mars** is moving fast against the constellations and soon leaves Taurus for Gemini. There are two meetings with the moon on the 2nd at 20h and on the 30th at 19h when Mars can be found 4° and 2.5° to the south respectively. Note that these times are before Mars has risen.

In mid month the planet's apparent diameter is in double figures and it now sports a negative magnitude which carries on decreasing (i.e. getting brighter) over the next couple of months.

**Jupiter** sets at 21:20 at the start of the month and it won't be too long before it gets lost in the evening twilight.

**Saturn** is still relatively faint and unremarkable when compared to its temporary companion of Venus in the morning sky although as they part company at the end of the month Saturn will very slowly start to brighten.

**Uranus** can still be found due south in the hours before midnight, but Neptune can now start to be considered unfavourable.

### Meteors

There are two showers that peak this month.

- **Piscids** reach their 3rd maximum on the 13th. Rates are low but the shower is favourable this year.
- **Orionids** are fairly favourable this year on the 22/23rd with the gibbous moon setting in the early hours of the morning. This shower is another one which has an association with Comet Halley.

### Lunar Occultations

**Alpha Leonis** (Regulus) 7th Disappearance 06:17, Reappearance 06:54.

For the third time this year on the 27th the moon occults the **Pleiades** star cluster. Start observing at 23:30 to see the brighter stars start to disappear behind the almost full moon. The last of the brighter members of the cluster reappear at around 01:00.

### Deep Sky Objects

**NGC7662** RA 23h 26m Dec 42° 32' (J2000) mag 8.3  
A small but relatively bright planetary nebula sometimes referred to as the blue snowball. The planetary is only about a quarter the size of the famous ring nebula, but being bright takes magnification well. A large telescope is needed to reveal a central void and the 13th magnitude white dwarf that powers the surrounding nebula.

**NGC7331** RA 22h 37m Dec 34° 24' (J2000) mag 9.5  
This magnitude 9.5 galaxy is like a miniature version of the nearby Andromeda Nebula, an almost edge on spiral galaxy that is adjacent to a galaxy group called Stephan's quintet. These other members of the group are a challenge for small telescopes being just a faint haze in smaller apertures. A good CCD target.

**M39** RA 21h 32m Dec 48° 26' (J2000) mag 4.6  
An open cluster with an apparent diameter equal to that of the full moon, it is rather sparsely populated triangular shaped grouping with around 30 magnitude 7 to 9 stars. This like many galactic clusters is an object best enjoyed through binoculars or a low powered telescope.

All times given are BST, GMT+1hr.

*Peter Burgess*

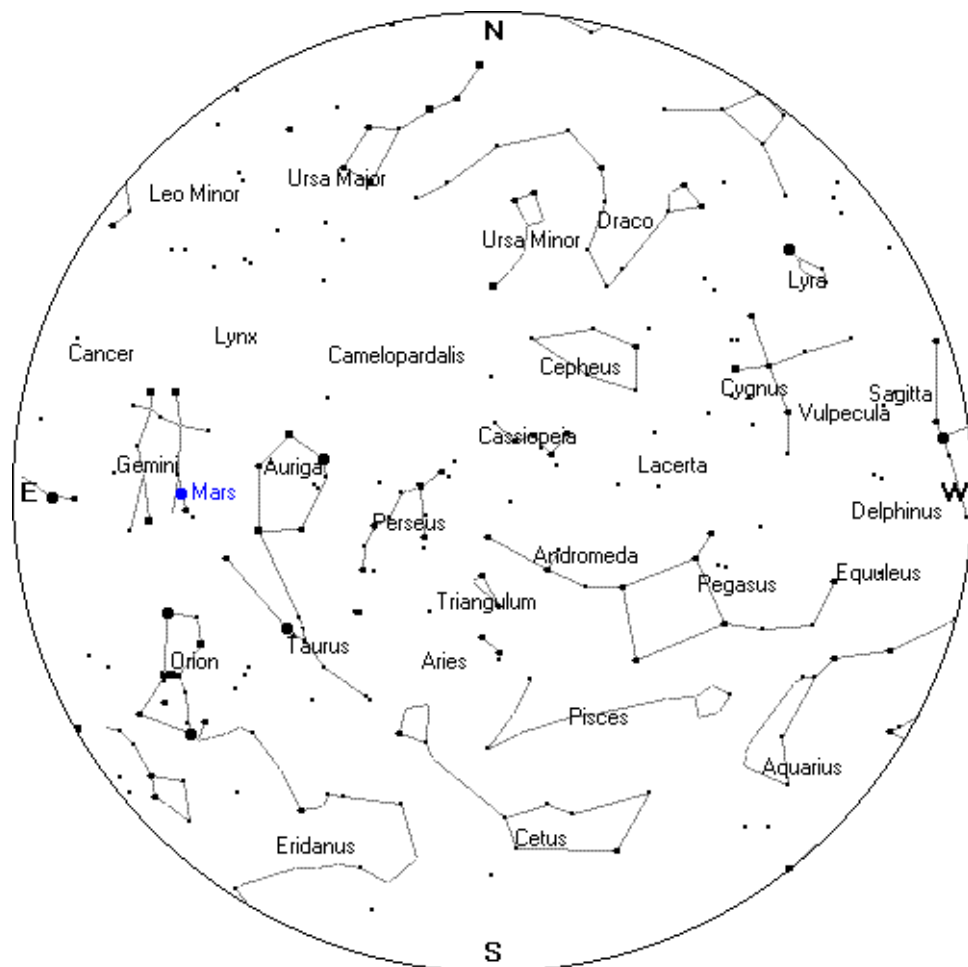
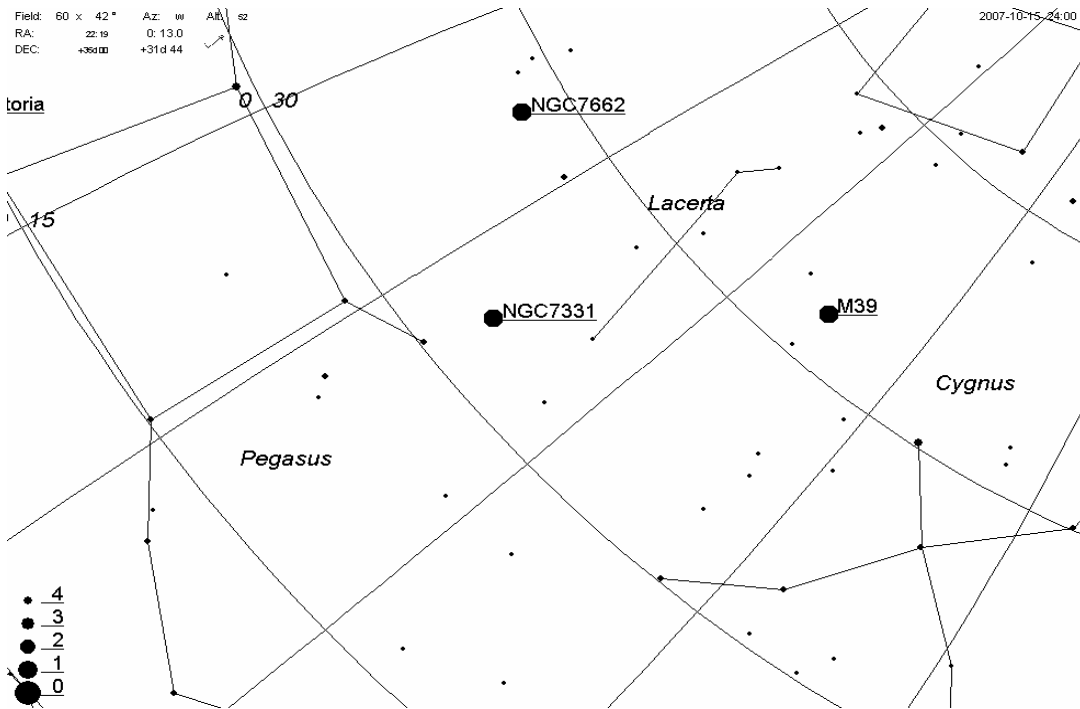
### Prisoners of the Moon

In February of 1876, the Chicago Times published an article claiming that scientists in Paris, using a new powerful telescope, had found buildings on the moon.

Not only that, but the observers spotted groups of workers chained together as if they were prisoners.



# October's Night Sky Charts

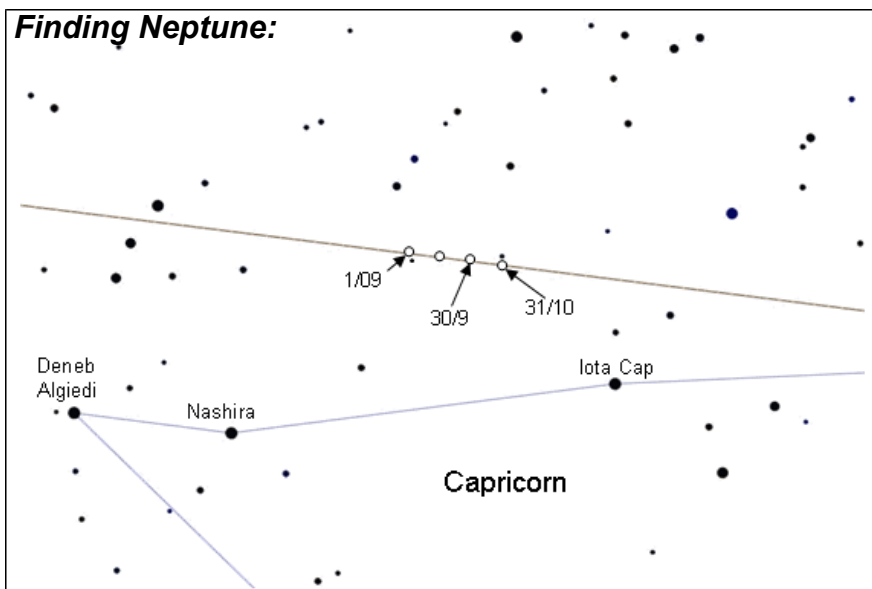


<http://www.heavens-above.com/>

## Neptune and Uranus

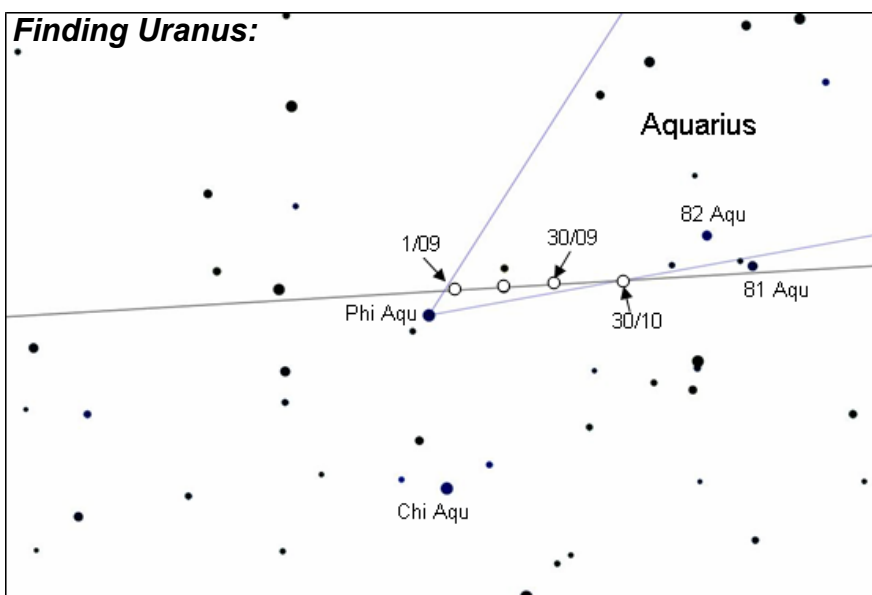
Uranus and Neptune are slowly moving apart as the god of the heavens leaves the god of the deep behind in their race around the solar system; but as both have very long orbits it will be many years before either of them is well placed for observation at our northern latitude. Even with them quite low in the sky they can be easily spotted with binoculars if you know where to look.

Neptune reaches its greatest elevation due south in our skies at about 22:00 at the start of the October and by 20:00 at the end. During November it starts to slip into the west as evening twilight darkens. Start by trying to find Capricorn, not always as easy as it sounds, none of the stars are particularly bright and the constellation is quite large. Even with a dark sky the haze can make it a challenge to trace out the triangular shape. Fortunately we do not need to see the lower half as Neptune is skimming the goat's back. Using a pair of binoculars find the goat's tail, Deneb Algiedi and look about a fingers width to the north, you should quite easily find the asterism marked on the finder map. Get to know this asterism; it will help you find Neptune for the next couple of years. Follow the lower



line of three stars to the west for about three fingers widths and you will come to Neptune. It is quite dim so you will need to have dark adapted your eyes for a while before trying to find it. The positions shown are for 30 September 31 October and 30 November. The planet reverses its direction of travel across the sky at the end of October, so it retraces the steps it took during September in November. Neptune is close a star of very similar brightness to its self at the end of October.

Finding Uranus is probably more difficult than Neptune, not because it is any fainter but because it is not located near any easily located stars. Like Capricorn all the stars in Aquarius are not particularly bright. Phi Aquarii the brightest nearby star is itself less than 2 magnitudes brighter than Uranus! Use the sky map to get yourself in the right area. Either by star hopping across from Capricorn, or from Pisces and Pegasus.



From the brightest star in the circlet of Pisces, (a little more than a hand width below the square of Pegasus) Phi Aquarii is the next brightest star about a hand width further down. Once you have Phi Aquarii you're almost there, Uranus is just to the west, about half way towards 81 & 81 Aqu. Like Neptune, Uranus will soon return to its normal eastward motion across the sky but is a little more sedate in reversing direction remaining almost stationary for about a month.

This is about as easy as it gets to find this planet for the next couple of years, after this there will be no bright objects nearby until 2010 when Jupiter will be on hand to point the way. Neptune remains in the region of Deneb Algiedi so once you have familiarised yourself with this part of the sky it should be not too difficult to find it next year and the year after.

*Peter Burgess*

## The Martian Enigmas 2007 (Part 6)



Considerable documented scientific evidence points to the very real possibility that there exists millennia-old ruins on Mars built by an unknown alien civilization. So where are the open public studies on these issues? That all the debated objects (including the “Face on Mars”) in the Cydonia region are natural occurring formations requires that some geological mechanism be proposed to account for all the diverse anomalies seen. This is a prevailing assumption, not a scientific conclusion despite the disturbing fact that NASA, or any research organisation, has yet to perform any reviewable scientific study that would bear out this position or produce coherent models to explain how such features could form naturally. Science by proclamation (defined as “the unnerving tendency to jump to a conclusion and expecting everyone to unconditionally swallow it based on authority”) doesn’t count. Despite more than 30 years since the first Viking images were wrongly dismissed as shadowed trickery, an honest and public scientific study of these features has been avoided. Just how then is the conclusion arrived at that the Face, etc. are natural formations? NASA will not even publicly acknowledge the extent of the Martian anomalies’ strangeness. It’s evident that the management of NASA’s Jet Propulsion Laboratory (JPL) - who are the dominant planetary explorers - have viewed the Face as a political problem, not as a scientific issue - personnel having provably tried to muddy the perception of the public through manipulation of Cydonia data in public press releases that are simply propaganda and not science.

The American space agencies almost unbelievable lack of interest since photographic Frame 35A72 of the Martian Face was taken by the NASA Mars orbiting Viking craft in 1976, along with the obstinate disregard for calls from independent professional scientists to investigate the Cydonia mystery, has contributed to raising deep suspicions in some. NASA’s provably obstructive behaviour in its handling of the Cydonia issue is consistent with the idea that the agency are either trying to hide the existence of alien artefacts, or that they have such a fear of discovering any, they will go to any lengths to avoid doing so. The idea that NASA (or elements therein) is secretly undertaking a program of planetary SETI while publicly debunking evidence of this (such as the “Face on Mars”), the debunking actually serving as “cover” for the secret program is maybe not as bizarre as it seems. An issue as potentially incendiary as the literal redefinition of our species would warrant certain contingencies. NASA’s charter makes it a civilian arm of the American military, which is why so many precious space shuttle missions have involved putting spy satellites into orbit. So it is entirely possible that NASA has co-operated with an undercover military programme of cautiously sweeping the Solar System for signs of alien visitations.

In a possible foreshadowing of our present predicament regarding Cydonia, a 1959 report (Brookings) commissioned by NASA recommended shunning disclosure of extraterrestrial artefacts discovered in the solar system. With the prospect of societal collapse being the main justification; overwhelmed by the magnitude of the discovery, the social fabric would lose cohesion, warning that public knowledge of advanced non-human intelligence could plunge our society into culture shock. The report concedes that contact with a high intelligence would destabilize us, possibly to the brink of existential obliteration. If our own history is any example, technologically robust civilizations inevitably subsume less sophisticated cultures, not merely by violently dismantling them, but by introducing a virulent strain of apathy. The report, in perhaps the most explicit elucidation of this idea, further recommends to NASA that the discovery of extraterrestrial artefacts be covered up for fear of paralysing research/development enterprises. Theorists have attacked the trite assumptions of mainstream radio-based SETI for the same reason. It’s unknown if the report’s recommendations are policy or simply speculative suggestions, but its existence is disturbing, and proves the possibility of ET structures - not mere radio signals - was taken seriously by a qualified multi-disciplinary team, and most likely by government as well. It reveals the mindset by which those in authority would justify a policy of secrecy, obstruction and double-dealing in handling the discovery of an advanced extraterrestrial civilisation too close to home for comfort.

Cydonia was considered an extremely “inviting target” for the Viking 2 lander way back in 1976. So much so that it’s on public record as the designated LANDING SITE for that spacecraft - it was thought this site had the best chance of finding atmospheric/liquid water and therefore extant microbial life. (Of late, from NASA’s THEMIS team themselves, commenting on the findings from NASA’s Mars Odyssey spacecraft currently in orbit: “The equatorial regions [of Mars] have since dried out to depths of hundreds of meters or more, but the middle latitudes, including places such as Cydonia, may have water-ice-rich ground only a few metres down. Water’s presence has implications for the chances of possible life -- and it might even be of direct use to future human explorers.”) But just before the Viking spacecraft was committed, the site was changed because Cydonia was suddenly considered “too rocky” for the lander to risk a touchdown -- this decision coming shortly after the very first “Face on Mars” image (35A72) was captured surveying this region of Mars for a potential landing spot for the Viking 2 mission. In the end, Viking 2 set down in a region known as Utopia Planitia, a more northerly and, as it turned out, rocky site than Cydonia - the craft being nearly overturned by a boulder in the process. Although the final decisions to land the two 1976 Vikings in Chryse and Utopia was ostensibly for safety reasons, the failure of further probes (such as one of the Mars Exploration Rover robot kits) to land in Cydonia is difficult to fathom, given our increased understanding of the Martian surface, and the

more advanced technology in use. Could it be that somebody was nervous enough about the Face to make sure the 1976 Viking team were somehow directed well away from the Cydonia region?

The fact remains, current Mars probes continue to publicly return high-resolution images of this enigmatic region. Whether additional photos have been taken remains an open question (there are even some that think that NASA's true intentions behind certain missions to Mars might be more occult motivated than scientific: admittedly, there are some bizarre coincidences that could back this up, but that's another story). Are we being skilfully (or unskilfully) acclimated to the existence of probable extraterrestrial ruins on Mars? Is some sort of psychologically "time-release aspirin" being fed: with just enough evidence in the publicly released images from the Red Planet to keep the hypothesis advancing, but not enough to put it over the top in the minds of the general public and media? It's worth noting that the Brookings paper recommended a period of acclimatization before revealing definitive proof of extraterrestrial intelligence. Speculation, and even some healthy paranoia, are useful tools, but we need to stay within the bounds of verifiable fact lest we become the very conspiracy-mongering caricatures painted by the mainstream media. In my opinion, in the future, it's unlikely that significant revelations will take the form of an official announcement. Accepting the reality and implications of extraterrestrial intelligence, assuming its works are on Mars waiting for us to explorer and discover will more likely be a quiet affair. The "Cydonia underground" (myself included, and hopefully, more persons catalysed by these articles) is driving this process in the only way it can, from the inside-out. Because, in my opinion, until the mainstream can muster the necessary foresight and savvy, there is definitely one KNOWN conspiracy operative at the moment, that of mutually assured ignorance!

### Related links

Brookings Report:

<http://www.enterprisemission.com/brooking.html>

"On Mars: Exploration of the Red Planet 1958-1978":

<http://history.nasa.gov/SP-4212/ch9.html>

<http://history.nasa.gov/SP-4212/ch10.html>

The McDaniel Report

<http://www.enterprisemission.com/mcdaniel.html>.

I have a copy of this document (plus a DVD of a talk given by Stan McDaniel from his 1996 UK lecture tour) to give away free (first come, first served), please email. Any thoughts to New Zenith or, I can be emailed at:

[alan.matthews3@jobcentreplus.gsi.gov.uk](mailto:alan.matthews3@jobcentreplus.gsi.gov.uk)

*Alan Matthews*



## Sputnik 50<sup>th</sup> Anniversary Party

IO W Observatory  
Watery Lane, Newchurch

### Everyone Welcome

Friday, 5<sup>th</sup> October - from 18.30  
Saturday, 6<sup>th</sup> October 10.00 to 17.00

Celebrating the 50<sup>th</sup> anniversary of the launch of Sputnik,  
the first satellite launched into space

There will be rocket launches, a quiz for both children and  
adults (*win space prizes*), space related freebies, an  
exhibition, tours of the observatory and a rocket raffle

*How to find us:*

At the Fighting Cocks crossroads on the A3056, take the turning  
towards Amazon World, enter the gate half way down this lane  
(opposite side to Amazon World) - Ample parking

We're on the No. 8 bus route too



### Meet Apollo Astronauts in London October 13th and 14th.

No less than 4 of the Apollo astronauts who walked on the moon, will be attending the next Autographica event in London in October. Buzz Aldrin, Ed Mitchell, Gene Cernan and Alan Bean will be available all weekend to answer questions, shake hands and sign autographs at the Autographica event held annually at the Radisson Edwardian Hotel, Heathrow London. More details at [www.autographica.co.uk](http://www.autographica.co.uk)

In addition, Al Worden, and Scott Carpenter will be there too, to meet space fans from around the country. Saturday evening will host a Gala dinner in aid of the RAF Benevolent Fund, with all the show guests in attendance. The Astronaut Space Foundation will also be auctioning some rare space flown and signed items with proceeds going to the ASF. Spaces at the dinner are limited but still available, see [www.autographica.co.uk](http://www.autographica.co.uk) for more details.

**The largest gathering of moonwalkers  
in the UK ever!**



## The Dark Side of The Universe

**Report on the August meeting -  
A talk by Dr. David Bacon - Institute of  
Cosmology & Gravitation, University of  
Portsmouth**



When we look at the large scale structure of the universe the galaxies can be seen to clump together into groups with a web like structure. To explain why the galaxies are not distributed uniformly throughout space we need to invoke a strange theory - there is a lot more matter out there that we cannot see. This is called dark matter that reacts gravitationally with normal matter but does not emit any radiation that we can detect with our telescopes.

Computers allow scientists to model the development of the universe from the time of the big bang to try and produce a distribution of galaxies that matches what we see now. The models only produce a universe that looks like reality if dark matter is included in the calculation. The amount of this dark matter required equates to about six times the material we can see.

Even individual galaxies do not contain enough matter to rotate as they are observed to do if they only contain the matter we can see. Individual stars orbit the centre of their parent galaxy at a rate determined by the mass of the galaxy. The mass required to cause the measured rotation rates indicates the same ratio of dark matter is present as indicated by the universe model.

If this dark matter exists then the obvious questions are what is it made of and can we detect it in any way. Dark matter can be detected by the effect it has on normal matter - causing the galaxies to rotate at their observed rates and via gravitational lensing. The appearance of distant galaxies is distorted as the light from these objects passes other galaxies on its way to Earth.

Two possible candidates for dark matter are galaxy sized black holes and brown dwarfs - objects that are star sized but not large enough to shine. Both these hypotheses are ruled out since they would not cause the observed gravitational lensing. The third candidate theorised is an unknown sub atomic particle called the WIMP - Weakly Interacting Massive Particle. An experiment to try and detect WIMPs is to be carried out at CERN near Geneva in May 2008.

Dark matter can explain the distribution of galaxies and their rotation but there is another strange component in the universe. By looking at distant galaxies the universe can be seen to be expanding, but is the rate of expansion constant?

By looking at distant supernovae a measure of the rate of expansion can be obtained at different times in the history of the universe. The mechanism by which supernovae occur is understood and the intrinsic brightness makes these events a standard candle to measure distance. Distant objects are seen as they were in the past when the light was emitted so measurements of the supernovae are measurements of conditions at that time.

The results of these measurements taking into account the age of the universe at the time of the supernovae indicates that the rate of expansion is accelerating. This is contrary to expectations since the mass of the observable universe would be expected to act as a brake to the expansion eventually stopping it and causing everything to fall back again.

To explain how the expansion could be accelerating we have to invoke the principle of dark energy and this energy will make up 65% of the universe. Hence the universe we can see is only 5% of the total - 30% being dark matter and the rest dark energy.

Dark energy can best be explained as a property of gravity on very large scales or an energy field that has been called quintessence - a property of tiny particles. This field has to be weak to allow gravity to operate at shorter ranges so that galaxies form. If the expansion rate continues to accelerate as it appears to be doing at present then the universe will eventually become empty space.

Two space missions are in development to measure the strength of the dark energy field - Joint Dark Energy Mission and Dark Universe Explorer. Measurements on distant supernovae will hopefully be underway by 2020. In addition Earth based systems will also be brought into operation, notably the square kilometre array of radio telescopes that will be built at a site to be determined in the southern hemisphere.

<http://www.port.ac.uk/departments/academic/icg/>

*Roger Young*

### Some Gut Reactions to Gyroscope Mechanics!

Science should dispel mysteries, not create them! Years ago, I mentioned to someone at a VAS Newport meeting, that in all my studies and teaching I have never encountered a simple explanation of gyroscopes. Textbooks talk of Euler's equations and apologize for not enough space. Worse, mysterious forces have been associated with gyroscopes. I wanted a simple picture of the causes of the forces. Given how many things in the Universe spin, a simple explanation is long overdue - so here it is... at last!

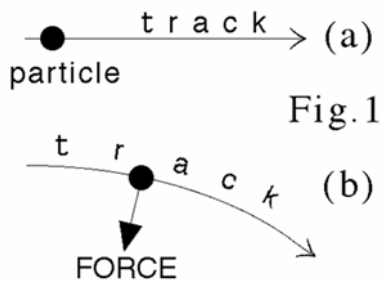


Fig. 1

A particle moves, under its own momentum, Fig.1(a), in a straight line. If acted on by a sideways force, Fig.1(b), the particle travels in a curve. A passenger in a car curving to the right, experiences a force from the car seat acting to the right, taking the passenger around the curve. Matter always has mass. Whenever a piece of matter moves in a curve, there must be a net force, coming from somewhere, acting sideways to the curve and in the direction in which the curve bends. Conker on a string? - don't wreck the conker, plant it! - the string would have pulled the conker into a curved orbit.

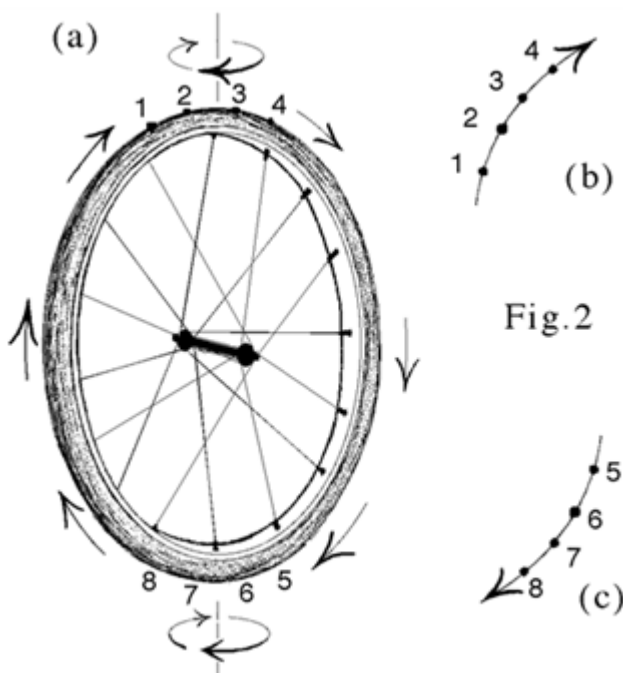


Fig. 2

Fig.2(a) shows a bike wheel spinning clockwise (viewed from the right). It is also slowly turning about a vertical axis, clockwise viewed from above - don't ask how it does this yet! On the tyre is a piece of muck. As the wheel turns, the muck occupies positions 1, 2, 3 and 4. Fig.2(b) shows the mucktrack viewed from above, forming a near horizontal curve bending to the right. The muck particle requires a force at the top of the wheel (parallel to the axle) to pull its motion sideways. Likewise the muck particle at the bottom of the wheel, occupies positions 5, 6, 7, and 8, giving the mucktrack (viewed from above) bending as in Fig.2(c), requiring a force in the opposite direction, acting at the bottom of the wheel.

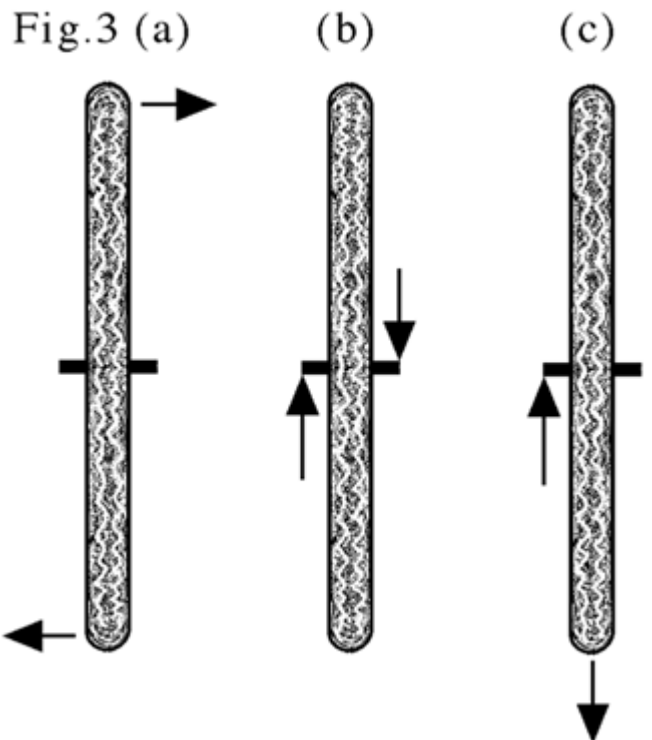


Fig.3(a) illustrates these forces that are required as a consequence of the wheel turning about the vertical axis. The forces constitute a 'torque' or turning moment, around a horizontal axis in the plane of the wheel. In Fig.3(a) the vertical turning axis is in the plane of the paper, the torque axis is perpendicular to the paper. A wood-screw with slot parallel to the axle in Fig.3(a) would screw into the paper under the action of the torque caused by the forces applied as shown. The necessary forces can conveniently be applied to the wheel at the axle ends, Fig.3(b). If the left-hand upward force equals the wheel's weight, the right-hand downward force must be removed, Fig.3(c), whence the wheel only supported at the left-hand end of its axle then 'precesses' around the vertical axis, in the direction of Fig.2(a), under the action of gravity and its own weight.

If no torque, other than to keep it spinning, is applied to the wheel, it retains its plane of rotation, so if mounted in gimbals, the axle makes a 'gyrocompass'.

The perpendicularity between the turning axis and the torque axis gives gyroscopes a 'curious feel'. Apply the forces illustrated in Fig.3(b) with the mistaken intention of turning the wheel around the torque axis, and the wheel has a 'mind of its own'. The wheel decides to turn around an axis perpendicular to the torque axis. If you don't let the (spinning) wheel turn the way it wants, then it responds by applying a torque back on its handler, at right-angles to the original applied torque, which now becomes the turning axis as originally intended.

There used be a story of some scientist with a suitcase containing a gyroscope - he whirled it up to high speed and placed the suitcase on a station platform, stood back and watched the fun - when picked up, the suitcase refused to go round corners or to be laid on a barrow.

The gyroscope is amenable to simple maths, see *Appendix*. I tested the directions given in my diagrams with a bike wheel at slow speeds - the logic works!

A yell from the background - my brother says this lack of understanding of rotation, verging on obfuscation, has a parallel. For decades, medical students were expected to comprehend a tangle of complicated material in *Gray's Anatomy* showing the so-called "rotation" of the gut, sometimes learning it off pat to pass exams. It was illustrated with a hotchpotch of diagrams with unstated changes of viewpoint; some doctors said they had never really understood. Richard found it possible to bring the information together in a fresh illustration with a specially chosen single viewing direction. It appeared in the 36th edition of *Gray's Anatomy* (which contains hundreds of his illustrations) and received comments 'for the first time I now understand'. But the new picture met resistance. Even the (late) editors of that time had said that if such a picture were possible it would already have been done. Eventually, after a huge struggle, they gave the thumbs up, but then, reluctant to depart from tradition, got cold feet and added a warning caption, so unsettled were they by this deliberate reduction in the mysteries of science.

**Appendix.**

The basic mathematical principles are seen in Fig.4. The ring of radius R and mass M, spins with angular velocity  $\omega$  around the z-axis, turning with angular velocity  $\Omega$  around the y-axis. In a time interval t, the ring spins through angle  $\omega t$  (radians). Point Q at the top of the ring, shifts to Q', along an arc of length  $R\omega t$ . If t be short, the angle  $\omega t$  is small, so in vertical projection, Q moves through  $R\omega t$ , in the bottom picture. (This is normal mathematical procedure and as t tends to 0, it is 100% accurate!) At the same time the plane of the ring turns through a small angle  $\Omega t$ , so Q' has acquired a z-value given by  $z=R\omega\Omega t^2$ . Differentiate twice with respect to time gives the z-acceleration of Q' of  $2R\omega\Omega$ . Elsewhere on the rim, the acceleration drops off cosinusoidally with angle

from the y-axis, changing sign when crossing the x-axis. Dividing the ring into mass elements, multiplying by the local acceleration and by the distance from the x-axis to give the torque and integrating, yields a total torque of  $\omega\Omega MR^2 = \omega\Omega I$ , where I is the moment of inertia of the ring about the 'spin axis'. If a wheel is supported as in Fig.3(c), then  $MgL/2 = \omega\Omega I$  giving the precession rate  $\Omega$ , where L is the length of the axle and g is gravity. This treatment is much simpler than usual - but if you have followed all this, you deserve to hear the story of the wood-rasp and the sausage roll.

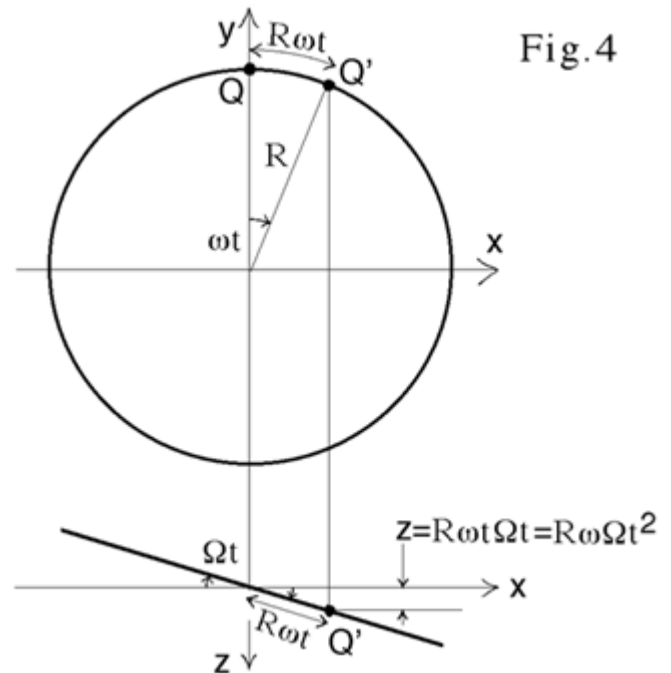


Fig.4

The motion of the particle of muck in Fig.2(b) is like the motion of part of a wood-rasp used to shape a piece of wood into a cylinder - the rasp stays flat, but the matter within it moves in curves. This reminds me of what happened when I went to Southampton to buy an LCR meter for my radio experiments. On the way back, I caught the bus at the terminal at Cowes. The driver skilfully shunted the bus to and fro around the corner of a roof garden, with a motion not unlike that of a huge wood-rasp. Seated at the corner of the roof garden was a man enjoying the view, a cup of tea and a sausage roll. With the appearance of the bus, his privacy was thoroughly disturbed - everyone in a window seat down one side of the bus was presented with uncomfortably close views of his half-bitten sausage roll from many different angles.



Dr Guy Moore

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LINKS, COMMENTS AND OBSERVATIONS

## Web Links

VAS and its officers are not responsible for the content of the web sites linked here. It is **your** responsibility to ensure you are protected against viruses and malware.

**Tom's Astronomy Blog**  
<http://tomsastroblog.com/>

**Spitzer Telescope**  
<http://www.spitzer.caltech.edu/Media/mediainages/index.shtml>

**Space and Astronomy**  
<http://www.space.com/>  
 Check out the "NightSky" Menu for Starry Night Online.

## Star Party

The Isle of Wight Star Party is to be held from Thursday 6th to Monday 10th March 2008 on the Isle of Wight. The site is on the dark southern edge of the Isle of Wight and it is New Moon so observing conditions should be good if the clouds stay away.

For all the latest information, please visit <http://www.IOWStarParty.org>

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## Electronic Zenith?

Members wanting to join the ever-growing list of those receiving their New Zenith by email can contact Bill Johnston at: [bill.johnston@onwight.net](mailto:bill.johnston@onwight.net)

Benefits of being on this list include getting your magazine earlier in the month, in colour and a significant cost saving to the VAS.

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## Phew!



*Bill*

Well that's it then... my first NZ done and dusted! I hope you enjoyed it and that the inevitable "first edition" changes didn't come as too much of a surprise. As mentioned earlier, we are currently discussing (and working on) the current VAS logo and are hoping to style future editions and other paperwork to promote a more coherent image of the Society. There will inevitably be other changes as we go along but, if there is anything you particularly dislike, then please let me know.

For anyone remotely interested in such things, NZ is now produced using FrameMaker on a PC. Why? well it's just that I am very familiar with that software and it's a lot easier for me than learning something new!

*Thanks to all who contributed to this edition and especially to John Langley for making the handover process so painless.*

## Overheard in the Observatory

**"Excuse me making a lot of silly suggestions, but..."**

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**"You don't need a license now, do you?"**

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**"What is the NGC number for the Foxhead Nebula?"**

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**"Can you buy red fluorescent tubes?"**

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**"Fill it with Helium and tie it to the roof rack..."**

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**"What's the front cover going to look like?"**

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**"The wave of belief crashes on the shores of incredulity"**

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## Factoid - Cruithne

Earth has a second moon, of sorts, and could have many others, according to three astronomers who did calculations to describe orbital motions at gravitational balance points in space that temporarily pull asteroids into bizarre orbits near our planet.

The 3 mile-wide (5km) satellite, which takes 770 years to complete a horseshoe-shaped orbit around Earth, is called **Cruithne** and will remain in a suspended state around Earth for at least 5,000 years.

*Any sufficiently advanced technology is indistinguishable from magic.*

- Clarke's Third Law

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## ...and finally...

*How many radio astronomers does it take to change a light bulb?*

*None! They can't be bothered with all that long wave stuff.*