



April 2009

ARMAGH PLANETARIUM

ASTRONOTES

Incorporating **FRIENDS' NEWSLETTER**

Does anyone really believe the Moon landings were faked?

The sky this month

What's the Dark Matter?

Rogue satellite on orbital rampage

The Apollo Hoax Hoax

Note: this title is not a misprint!

Opinion piece by Colin Johnston, Science Communicator

The Apollo project to send people to the Moon lasted more than a decade. Throughout the years in which the rockets and spacecraft were developed, NASA distributed press releases, motion pictures and photographs aplenty while inviting the world's press to watch. The actual Moon landing missions were broadcast live worldwide. The Apollo project to send people to the Moon was one of the best recorded historical events ever. Yet forty years later some people claim that it never happened!

Over the past decade or so there have been several books (usually self-published by their authors) and television programmes expounding the theory that NASA was unable to send the Apollo missions to the Moon, so the US government fabricated the whole thing. All the magnificent spacecraft were props, the photographs and motion pictures phonies and the astronaut activities mere scripted shams. More recently this theory has spread throughout the internet with dedicated websites and YouTube videos proclaiming that we never visited the Moon. Instead the landings were filmed on a Hollywood soundstage or the Nevada desert, the astronauts' low-gravity hops simulated with wires or camera trickery and the Moon rocks are just meteorites or doctored Earthly rocks. Why do people say this?

“The denial of Apollo’s reality is a strange sociological phenomenon...”

The denial of Apollo’s reality is a strange sociological phenomenon I struggle to understand. No one as far as I know denies that other historical events of the period, such as the wars in



Image Credit: NASA

“The lunar module looks lame!” Posters to internet forums frequently assert that Apollo hardware does not match their preconceived views of how spaceships ought to look (apparently something like Tintin’s Moon rocket). The LM’s foil covering is often said to show that the vehicle was actually just a cheap mock up.

Vietnam and the Middle East, never actually happened and claim them to be elaborate hoaxes. Yet I find this denial of fact (and science, never mind common sense) horribly fascinating. I do not think that it is necessary to deconstruct the hoax proponents’ tired old arguments (No stars in the pictures! The van Allen belts are deadly to astronauts! The lunar module looks lame!) as I am sure that most Astronotes readers will be knowledgeable enough to do that themselves. Instead I am going to explore why people make this outlandish assertion. I am going to concentrate on this peculiar meme as it appears on the internet rather than other media, but I think this is justifiable as it seems largely a creature of the Internet Age. Be warned, this article is largely my own personal opinions and (like hoax supporters) I have no evidence to back up my conclusions.

Contrary to most Apollo Hoax material, its

proponents are not members of a heterogeneous 'movement' to expose the Truth as some of them claim. Instead you can separate them into categories I call Opportunists, the Deluded, Satirists and Attention-Seekers. I am not going to name names in an attempt to deny these people the "oxygen of publicity".

Opportunists may or may not actually believe that the moonlandings were faked. But promote the idea to make a living through selling books, DVDs and TV shows. They are in it for the money and as we all have to make ends meet I suppose they cannot be criticised for that at. However when you are actively distorting to deceive ... Probably the highest profile and best known hoax documentary was made in 2001 by one of the biggest US TV networks. One of its prize pieces of evidence was footage of the US flag waving in an impossible breeze on the Moon. The narrator did not tell the audience that this short sequence was filmed immediately after the flag was raised. The show's producers did not show the following hours of film footage taken later which showed astronauts moving around the flag which appeared frozen motionless as would be impossible on Earth. TV shows are not often made by stupid people, so they knew exactly what they were doing, setting out to lie to their audience. (Does that make you angry? It should.)

"A YouTube video with a rock soundtrack trumps mere evidence "

The Deluded truly believe that a huge conspiracy faked the moonlandings and that scientists world-wide are 'in on it'. Many see the hoaxed landings as a small part of a bigger picture, as part of a scheme to establish world government by the Illuminati, force acceptance of Einstein's theories on the population or hide contact between governments and extraterrestrials and so on. One (sadly recently deceased) author of a book 'exposing' the hoax also has many other claims of inaccuracies in science; including the fact that Pi is exactly equal to 3.14626. A cabal of mathematicians were (he said) covering this up and actively persecuting him to avoid paying out a hefty cash prize for this discovery. Another



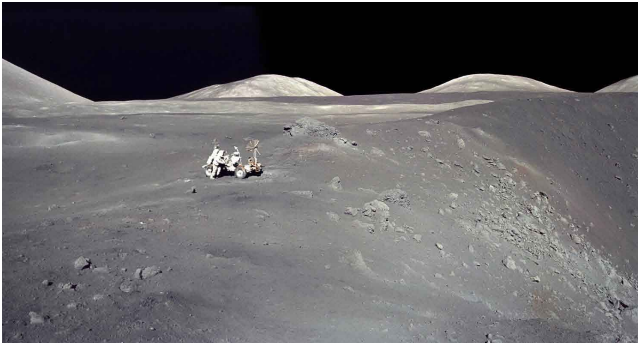
Image Credit: ESA

Foiled again! The Lunar Module was not unique: satellites and space probes are frequently insulated by carefully designed sheets of kapton (not tinfoil!) Here the INTEGRAL satellite's SPI (SPectrometer for INTEGRAL) is prepared for thermal vacuum tests.

poster to an internet forum revealed his mental state when he began his lengthy diatribe with the words: "My ax to grind is ancient, my family is the true royal family of the United Kingdom. The same cults that dominate the world have stolen my Kingdom. I will get it back, and to do that I have looked at the moon landings and have proven absolutely that it is a World Order hoax."

Some of the Deluded may genuinely believe the hoax theory not because they are mentally-ill but rather because they appear to have been raised in an environment that is not only science-free but has indoctrinated them with the idea that your feelings and opinions on a subject ("I reject your reality and substitute my own!") and how you express them are more important than the facts. Unfounded speculation expressed forcefully and pretentiously enough (ideally on a You Tube video accompanied by an awesome rock soundtrack) trumps mere evidence any day.

The Satirists accept the historical record but pretend to expound the hoax theory either as a piece of comedy or mockery. For example there is a feature length 'mockumentary' chronicling how the late Stanley Kubrick was black-mailed into creating the fraudulent movies of moon-



That's one huge soundstage! Apollo 17 astronaut Harrison "Jack" Schmitt and the Lunar Roving Vehicle on the rim of Shorty Crater, Taurus Littrow in December 1972. Sadly Hoax proponents don't know Jack Schmitt about Apollo's reality!

walking astronauts. Despite many internal jokes exposing it as a spoof, some people apparently accept this as a genuine documentary. A good example of the other type of satire was a (no longer available) website ostensibly written by an American university lecturer with advanced degrees in science which 'proved' that the Apollo missions (and by implication all other space travel) were impossible according to the laws of physics. Throughout the piece, the writer, or (I suspect) more accurately the character portrayed by the writer, continually proclaims his Christian faith and how it is incompatible with acceptance of the Moon landings. This, I think, is the key: the piece is actually intended by its author to say "Look how stupid these fundamentalists are, they don't even believe in the Moon landings!"

"Moon landings were fully false shot in a studio"

My last category in my bestiary of Hoax supporters is the Attention-seekers. These are usually posters to astronomy or space-related internet forums for example www.bautforum.com) Most of the people who view such sites are genuinely interested and knowledgeable about these subjects, so it's easy to grab their attention with a 'drive-by', posting something like "Show us the proof that the moonlanding was real and we can talk about whether it's really proof. So far I haven't seen any." As a result there are dozens of responses full of engineering and scientific knowledge posted, meanwhile the gleeful poser

of the original question settles back to watch the fun and is never heard of again. Alternatively if they do respond, they start a dialogue with the mainstream forum members which can continue sometimes for weeks. I believe that in their posts many of these people are adding to their fun by playing a character which is not their own. For example, they often declare themselves to be from countries where they claim the Hoax theory is generally accepted or even taught in

schools (Spain, the Netherlands, Laos, Lebanon are some of these supposed countries). To show that English is their not first language, their posts are often written in a comedic foreign idiom, like "Moon landings of 1969 were fully false shot in studio since USA had not the big technology indispensable to land men on the Moon and let them come back".

Their posts are interesting at first but settle into a repetitive pattern. This starts when the Hoax Proponent puts forward some incredibly weak argument to claim a specific aspect of the historical record proves that the moonlandings were a hoax, dozens of other posters respond pointing out the error in this claim. The Hoax Proponent ignores these and makes another specific claim, which is again shot down; he (I suspect they all are male, even those who introduce themselves as females) ignores this and makes another claim and so on ad nauseam. Eventually he starts back to his original claim. There is no sign that he is interested in the content of the debate he started, he is just like an arsonist enjoying the blaze his match started and occasionally stoking the flames. I suspect that there are very few of these people, the dozens of hoax posts are generated by a very small number (perhaps even in single figures) of individuals hiding behind multiple User Names who have too much time of their own and enjoy wasting other people's time. Eventually these trolls get bored and start violating the forum's rules by using expletives or insulting other members, accusing them of snobbery, elitism, of being 'sheep' or government "disinfo agents" and so on. The intention is to go

out in a blaze of glory by being banned from the forum. I'm sure they get a lot of fun out of this.

Essentially, I do not believe many of the people who publicly claim that NASA carried a massive deception on the world's population genuinely believe this. A few ill-educated or unhinged people may subscribe to this but they are in the minority. Most Hoax proponents are too smart

to believe this nonsense; instead they are doing it to sell books or DVDs or because they enjoy being controversial. The preposition that there is a widely held belief that the Apollo programme was a hoax is itself only a hoax.

Further reading

www.clavius.org/

www.badastronomy.com/bad/tv/foxapollo.html

What's the Dark Matter?

By Orla O'Donnell, Education Support Officer,

The young people that visit us here in the Planetarium often have some interesting questions and comments, my personal favourite was when a little girl asked me "Do dwarfs come from dwarf planets?" Most of the young people seem to be preoccupied by the most mysterious of subjects, like black holes and dark matter, subjects obscure to even the most knowledgeable of astronomers. Dark matter is an especially elusive substance and one topic that is quite difficult to explain to an eight year old but in this article I am going to try to unravel the mystery of what is 'dark matter'?

"Hubble also uncovered a cluster of dwarf galaxies that were perfectly intact and unaffected by the gravitational pull"

In recent weeks new research has revealed that dark matter may be responsible for protecting galaxies. In the Perseus Galaxy cluster, the Hubble Space Telescope has uncovered a lot of large galaxies that are beginning to rip apart due to the gravitational pull of other galaxies. Hubble also uncovered a cluster of dwarf galaxies that

were perfectly intact and unaffected by this destructive gravitational pull. Researchers have proposed that dark matter is protecting these ancient galaxies. Scientists from the University of Nottingham have made suggestions that there may be more dark matter in smaller galaxies than there is in larger galaxies like the Milky Way. So dark matter seems to be an integral part of space but what is it? How do we know it exists?

NASA's dictionary defines dark matter as 'A name given to the amount of mass whose exist-

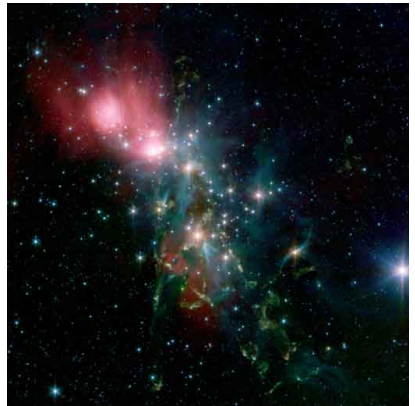


Image Credit: NASA

More than meets the eye This image of the cluster of galaxies known as MACSJ0025.4-1222 was taken Hubble Space Telescope. It shows a separation between dark and ordinary matter and is used by astronomers to study the substances.

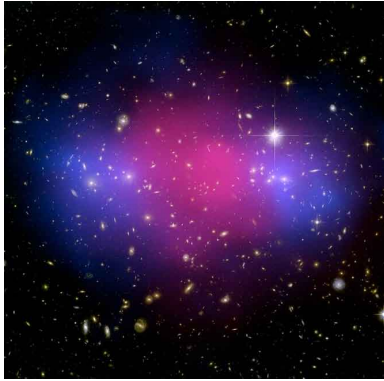


Image Credit: NASA

The Perseus Cluster of dwarf galaxies where recent research was conducted into dark matter's role in protecting dwarf galaxies to being disrupted by larger galaxies.

ence is deduced from the analysis of galaxy rotation curves but which until now, has escaped all detections. There are many theories on what dark matter could be. Not one, at the moment is convincing enough and the question is still a mystery'. That definition is as clear as mud, but in laymen's terms dark matter is all the substances we can not see in space. How do we see in space in the first place? Everything in space that astronomers observe using an Earth or space-based telescope emits 'light' as some form of electromagnetic (EM) radiation. This radiation is not all visually accessible; some EM radiation comes in the form of radio waves, infrared, ultraviolet, x-rays or gamma rays. This light may not be visible with the naked eye but reveals its existence to instruments. So now we know what we can see in space, how do scientists know that there is an invisible substance out there too?

Our Universe is extremely vast and largely empty, we can see that the matter in the Universe is divided up into countless galaxies which are giant islands of stars held together by gravity. Our planetary system orbits around an average-sized star in just one of those galaxies called the Milky Way. These galaxies are drawn together by gravity into clusters. Scientist can study the light emitted by the stars in a cluster of galaxies. They then can determine the total material mass in that cluster and compare it to the mass needed to hold the cluster together. Astronomers have in the past conducted this experiment and their results proved that there was a lot more mate-

rial in a cluster of galaxies than expected thus proving the existence of an unseen substance. The extraordinary conclusion is that between all the visible material in space there is another substance that cannot be observed!

“Our universe is extremely vast... divided up into countless galaxies, islands of stars held together by gravity”

The substance was named Dark Matter as it does not emit light. The concept of dark matter first started to be mentioned in astronomical circles about eighty years ago when the feisty Fritz Zwicky (1898- 1974) observed a galaxy cluster that contained too little visible material to hold itself together. Later astronomers saw that many spiral galaxies were rotating so fast that they ought to gradually unwind or even be torn into pieces. The gravitational influence of some unseen substance must be holding them together. Now it seems that in fact there is more dark matter threaded through the Universe than ordinary matter. We can only see 4% of the stuff the Universe is made of!

Although astronomers are mostly in agreement that this substance really exists, what it is and how much there is exactly is still hotly debated. We have no idea! Presumably it is composed some exotic particles unknown to nuclear physicists

I hope this article is some help to those of you who are interested in trying to understand this elusive and mysterious topic. For further reading see:

<http://www.darkmatterphysics.com/>
http://chandra.harvard.edu/xray_astro/dark_matter/index.html
<http://www.eclipse.net/~cmmiller/DM/>
<http://physicsworld.com/cws/article/print/809>
In Search of Dark Matter by Ken Freeman and Geoff McNamara, Springer, 2006

The Worlds come to Armagh!

By Alyson Kerr, Education Support Officer

As it is the International Year of Astronomy, we have been trying to think of ways for Armagh Planetarium to keep astronomy in the public eye. What better way to attract some attention and work with the local community than in Armagh's annual St Patrick's Day Parade? This year's theme was 'The World comes to Armagh', our variation was slightly different, substituting 'World' for 'World's'. We decided to invite along our favourite Star Wars costuming club, the Knights of the Empire (KOTE). They have always been enthusiastic supporters of Armagh Planetarium and help to bring in the crowds, there is nothing like the astonishment on a child's face when Darth Vader walks around the corner! As well as KOTE, we wanted local schools to join us in the parade. No parade is complete without kids in costumes, and we enlisted 12 pupils from St Malachy's Primary School, Armagh.

"Knights of the Empire are enthusiastic supporters of the Planetarium"

A few weeks before St Patrick's Day, we journeyed down to St Malachy's to design and create some costumes for the big day in association with the Beam Centre, Dungannon. The pupils had the choice to become either an astronaut or an alien for the day. Armed with cereal boxes, tin foil, glitter and glue the creations began! Some especially imaginative costumes began to emerge with designs for heat shields, jet packs, alien antennae and much more. After two hours, the costumes were ready and all that remained was to spray paint them the universal astronaut silver to make them look spacey!



Image Credit: All images Alyson Kerr, Armagh Planetarium

Dum Dum Dum, Dum-te-Dum, Dum-te-Dum The Empire matches into Armagh.

On St Patrick's Day, the Planetarium was full of all sorts of aliens, from both sci-fi movies and their own imagination. While we donned our costumes there was constant curiosity about all things extraterrestrial. The St Malachy's pupils had an opportunity to see our giant meteorite



Lord Vader went on a walkabout and shook a young Jedi warmly by the throat.



Return of the Teddy? Darth Maul isn't afraid to show his softer, more caring side.

and learn about some of our amazing images taken by the Hubble Space Telescope. We gathered at the Shambles market and following the introductory speeches by local dignitaries, we were on the road. Hundreds of people lined the route through Armagh and our aliens and astronauts did a fantastic job of handing out stickers to the crowds. Many people gaped in awe as Darth Vader, Darth Maul, Boba Fett, R2D2 and a dozen imperial Stormtroopers marched through the city centre. It was certainly an eye-catching spectacle. The parade finished at the Palace Desmène where there were photo opportunities for anyone looking for a great image.



Space Ace of the Future? Take some bubble-wrap, a plastic bottle and silver paint. Add some imagination and voila! A fantastic costume!

This is the first year that we have participated in this parade but it is certainly a tradition that we would wish to continue in the future. Much of the feedback that we received on the day was very positive, with many promising to visit us and get involved with IYA 2009.

Rogue satellite on the rampage

By Nigel Farrell, Education Support Officer

In recent months there has been considerable debate regarding the fate of Defence Support Program Flight 23 (DSP- 23) an American military satellite. Rumours and news stories circulating on the internet and in the media suggest that DSP-23 failed sometime around mid-September 2008 leading to a possible gap in the missile warning capabilities of the United States defence programme.

DSP-23 is obviously an integral part of US national security, a fact highlighted by its role in

detecting and tracking enemy missiles. This is possibly the reason why the Pentagon has, as yet, remained somewhat tight-lipped as to the consequences of its apparent failure. Consequently, this has led, rather unsurprisingly, to much speculation, particularly by those discussing the event on internet forums.

At the moment it appears that the \$400 million U.S. Air Force satellite is moving eastward through the geostationary belt of satellites which surrounds the Earth, at an altitude of approximately 36 000 km (22 400 miles). It is said that the rogue satellite no longer appears to be under



DSP satellite in space The vehicle's infrared sensors use a wide-angle Schmidt telescope. The DSP series of satellites are to be replaced by a much-delayed system known as the Space Based Infrared System (SBIRS)

US ground control, and it is also unlikely that it will be recoverable any time soon. As the satellite is drifting in orbit there is considerable concern that it could cause a collision similar to that which destroyed two Russian and American satellites in early February.

As yet the US government has not publicly revealed the exact position or indeed drift rate of DSP-23. However such is the worry that another collision would lead to an international incident, unconfirmed reports suggest that commercial owners and operators of satellites close to DSP-23 have been informed that they may need to manoeuvre their spacecraft out of the way.

DSP-23 was built by Northrop Grumman corporation and launched from Cape Canaveral Air Force Base in November 2007 and became part of the "constellation" of US defence satellites charged with providing an early warning system against enemy missile attack. The DSP satellites are designed to detect the intense heat of missile and space launches from the surface of Earth. Due to the sensitive nature of their occupation the exact number of defence satellites is publicly unknown, however speculation by satellite

observers suggests that there may be between six and ten fully functioning DSPs operating in an orbit around the Equator, giving multiple satellites coverage over any one point on Earth at the same time.

The first indications that something was amiss with DSP-23 actually came, not from the government but instead from the amateur satellite observing community in mid-November. Satellites such as the DSP series are said to be "invisible" however amateur satellite trackers have been looking out for and tracking these secret craft for some considerable time. DSP-23 in particular is some 7m (22 ft) in diameter, 10 m (33 ft) long (as long as a double decker bus) and weighs 2381 kg (5250 lbs) (not exactly indiscreet I think you would agree). Thus, at the start of November one observer was able not only able to track the satellite but had equipment that could measure radio signals emitting from the craft, and was therefore able to discern that DSP-23 was no longer transmitting. The first media report on the stricken craft came from the Reuters news agency on 24 November 24. Reuters reported that the satellite had stopped working in mid-September.

"..the rogue satellite no longer appears to be under US ground control"

Since the 1970's the US government has launched 23 DSP satellites into orbit. One was even launched from the Shuttle Orbiter Atlantis in 1991 (STS44). The six or ten currently functioning satellites correspond to around twice the number required to watch over the Earth at any one time. The vast majority of these satellites have continued to operate well beyond their expected life-span, however there is considerable concern that one of the latest of these craft has malfunctioned a little over a year since its initial launch.

Since November DSP-23 continues to drift eastward through the Geostationary belt at a rate of 1° of longitude per week, over time it will reverse its position as it is affected by the two "gravity troughs" near the Earth's equator which pull satellites in geostationary orbit east or west

depending on which is closest. Over time it is said that DSP- 23 is likely to oscillate between 8° and 135° E until it eventually settles in a stable position within the trough, remaining there with many other captured objects until someone figures out if and how they can be retrieved should it become necessary.

Though some amateur observers have noted considerable concern that DSP-23 could pose

a threat to other craft operating in geostationary orbit defence officials have stated recently that they believe it poses no immediate threat to human life. However, one can only feel that any state with defence or security type satellites in space should declare their positions, thereby discouraging speculation among nations as to whether or not any one satellite poses a military threat.

The Sky in April

By Tracy McConnell, Education Support Officer

Welcome back to the “Night Sky Guide” for April 2009. At this time year, partly due to daylight savings, our nights are getting later and shorter, with the sun setting soon after 8.00pm and rising at approximately 5.00am.

Our wandering star Venus, has traversed to the morning hours so we will not be able to see it in the evening. You can find it in the very early morning (around 4.45am), low over the eastern horizon, shortly followed by the Red Planet, Mars. Be extra careful if you are up early enough to look out for these two planets as the Sun is rising in this direction and its dangerous to be looking at it directly. Also at this early time of the morning, Jupiter can be found low on the horizon in the SE.

“Be extra careful if you are up early enough to look out for these planets as the Sun is rising in this direction”

The guide presented here is based on the stellar positions at 11:00pm on 15th April, and while the stars don't change much from day to day, their relative positions will move across the sky throughout the night. The only planet visible at this time is Saturn, it can still be found in the constellation of Leo the lion, which is SSW (Saturn is almost directly south) just ahead of Leo's rear paw.

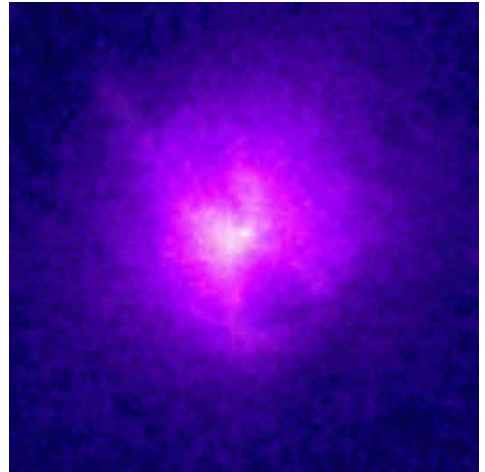


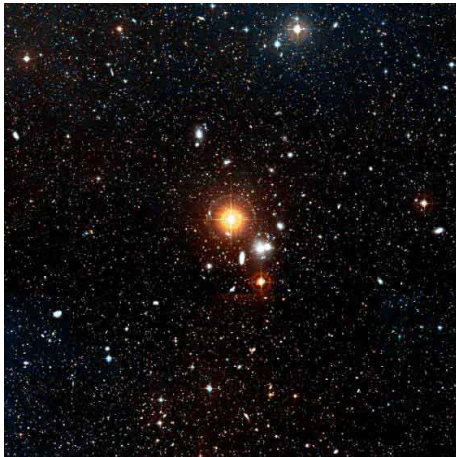
Image Credit: NASA/CXC/SAO

Hydra A a galaxy cluster that is 840 million light years from Earth. When the light that formed this image started its journey Earth was almost entirely covered in ice (Snowball Earth) and complex multi-cellular organisms had yet to appear.

Spanning from SE to west is the largest constellation in the sky, Hydra the water-snake. The head of Hydra is a small circular nodule just below the constellation of Cancer in the WSW, about half way up the sky. The body of Hydra is simply a line of stars across the sky with the final star, the end of the tail of Hydra, in the SE very low on the horizon. This constellation has a myth that intertwines with two other nearby constellations in the sky.

These two constellations are almost directly south. Corvus is a rhombus shape just above the tail of Hydra. If you are facing Corvus, due south, the next pattern is just on your left and is partly attached to Hydra. It's called Crater, and to me looks like a rhombus with two little feet in the air. In the myth, the Greek god Apollo, sent a crow with a cup in search of water for him. The crow found a tree full of fruit which was almost ripe. It decided to wait a few days for the fruit to ripen so that it could eat its fill. Of course, by this time Apollo had resorted to going in search of water for himself. Eventually the crow decided to return and on the way he scooped up a water snake to use as a scapegoat for being late. When the crow returned, it told Apollo that the snake had been blocking the spring. Apollo saw that this was a lie and angrily threw the cup, snake and crow into the heavens. Crater is the Cup, Corvus is the Crow and Hydra is the Water Serpent. Hydra is home to an interesting Galaxy cluster which gets its name from the strong radio source, Hydra A, which originates in a galaxy near the centre of the cluster. Optical observations show a few hundred galaxies in the cluster.

The Crater constellation has three deep sky objects which are all galaxies. NGC 3511 is a



Abell 1060 The Hydra cluster is one of the three largest clusters of galaxies within 200 million light years. The galaxies here are visible as the various white blobs. The bright orange star at the centre of the picture is much closer. It is HR4162 - a fifth magnitude red giant star 480 light years away.

slightly barred spiral galaxy, which is seen almost edge on. It is a member of the galaxy cluster Abell 1060. NGC 3887 is a barred-spiral galaxy and NGC 3981 which was discovered by William Herschel in 1785 is a spiral galaxy with two wide spiral arms.

“Apollo saw that this was a lie and threw the cup, snake and crow into the heavens”

Corvus contains no Messier objects, however the Ringtail peculiar galaxy can be seen as a heart shape and consists of the NGC 4038 and NGC 4039 galaxies which may be colliding. Also at the centre of Corvus is a planetary nebula NGC 4361. The nebula itself resembles a small elliptical galaxy, but it has a high magnitude star at its centre which proves it is the site of a dying star.

There are only four of our familiar Zodiac signs visible right now. Virgo is half way up the south facing sky, with Leo and Cancer further to the left facing SW, and Gemini is further left again facing directly west.

Böotes, which I covered last month, is high in the ESE sky, along with Hercules lower in the eastern sky. As usual our circumpolar constellations are high in the sky from NE to NW. And just over the NE horizon, two constellations which I covered in my first night sky article back in July, have risen. Cygnus the Swan and Lyra the Harp, two of the three patterns which are part of the summer triangle. They will slowly be making their way south in the sky over the next few months.

I hope you've found this guide useful and that your skies are clear for stargazing.

Moon Phases, April 2009

Thurs 2 April	First Quarter
Thurs 9 April	FULL MOON
Fri 17 April	Last Quarter
Sat 25 April	NEW MOON

Image of the Month

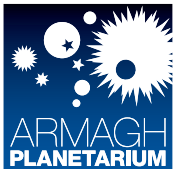


Image Credit: NASA

This wonderful image, entitled 'Beauty is the Night', captures the reflection of the Space Shuttle Discovery in the waters of Cape Canaveral. This mission, STS-119, is no ordinary assignment. The successful launch of this shuttle marks 125 space shuttle missions. The Space Shuttle program was first conceived in the 1970s as a possible way to reduce the cost of space travel. The prototype space shuttle was named Enterprise and did not go on any actual orbital missions. The first shuttle to fly in space was Columbia and was launched on 12 April 1981 neatly coinciding with the 20th anniversary of Yuri Gagarin's first space flight. The space shuttle program was to go on to both great success and disasters. Despite the Challenger and Columbia tragedies the Space

Shuttle program signalled a new age in the history of space flight and I am sure that there will be great sadness when the program ends. The shuttle programme is due to go into retirement in 2010 and be replaced by Project Constellation.

The mission pictured is the 28th shuttle flight to the International Space Station. Included in its load are a pair of power-generating solar array wings, the last one needed to complete that section of the ISS. The seven crew members of mission STS-119 set off on 15 March 2009 and are due to carry out a space walk and also exchange one of their crew members for a long-serving crew person of the International Space Station. (Caption by Orla O'Donnell, Education Support Officer)



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Astronotes, Incorporating Friends' Newsletter is published monthly by Armagh Planetarium, College Hill, Armagh, Co. Armagh BT61 9DB
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