

# Wadhurst Astronomical Society Newsletter March 2014

## MEETINGS

### FEBRUARY MEETING

As usual, the meeting was opened by Phil Berry who welcomed members and visitors.

After introductions he said that members of the Society have been invited by the British Astronomical Society to attend a General Meeting of the Radio Astronomy Group in Leicester on Saturday the 17<sup>th</sup> of May beginning at 1030 and costing £12 for members of the BAA and £15 for non members. There was a form at the meeting for interested members to add names but further information may be obtained from Phil Berry.

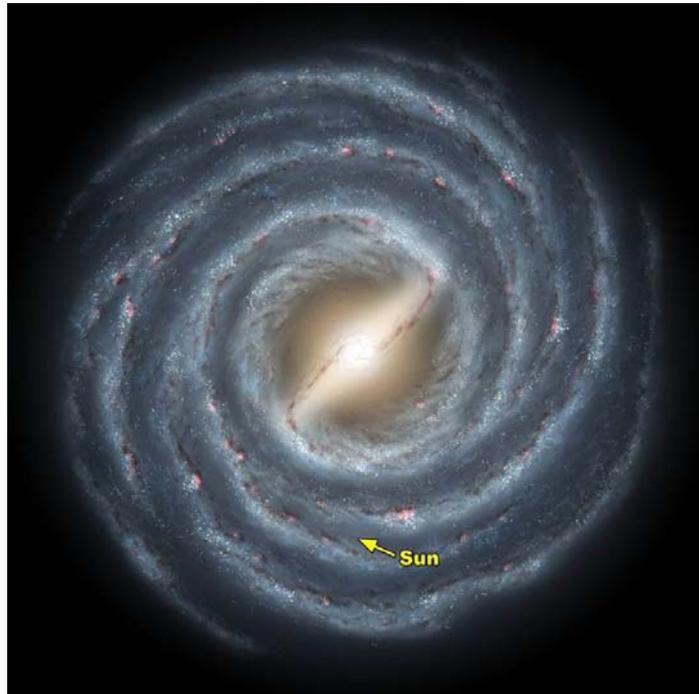
Following this, Phil introduced our speaker for the evening, our own Jan Drozd whose talks have intrigued members on a number of previous occasions.

### **Life, the Earth and the Universe**

*Jan Drozd*

Jan said he had given this talk to Tonbridge School just before Christmas, and was an updated talk of one he had given us some time ago.

He posed the question; "How many stars are there in the known Universe?" The answer is staggering. There are something over 100 billion stars in each galaxy and there are at least 100 billion galaxies so there must be something in excess of  $10^{22}$  stars and around many of these stars there could be planets! So what is the chance of there being life elsewhere in the Universe?



*An illustration of our galaxy, the Milky Way*

The Milky Way alone is about 100,000 light years in diameter and has between 200 and 400 billion stars. To give an idea of distance, the nearest star to the Earth after our sun is Proxima Centauri, 4.2 light years away and would take a spaceship at least 20,000 years to get there.

Jan showed a slide of just one image taken by NASA's Hubble Space Telescope. It was only 3 arc minutes square but it was estimated to contain around 10,000 galaxies. In fact he went on to say that the Big Bang occurred 13.8 Billion years ago and it may be that light from distant parts of the Universe hasn't even had time to reach us yet.

So with such a vast number of planets in such a vast area, what is the chance of life existing elsewhere? Jan said that many of the basic cosmological and physical constants seem finely tuned to allow life as we know it. If gravity was stronger for example, stars would die sooner and our sun would not have lasted long enough for life to evolve on Earth. It seems that many basic cosmological

& physical constants are like Baby Bear's porridge; "just right" and this is sometimes called "The Goldilocks Enigma" and is discussed in books written by a highly respected astro-physicist, Paul Davies.

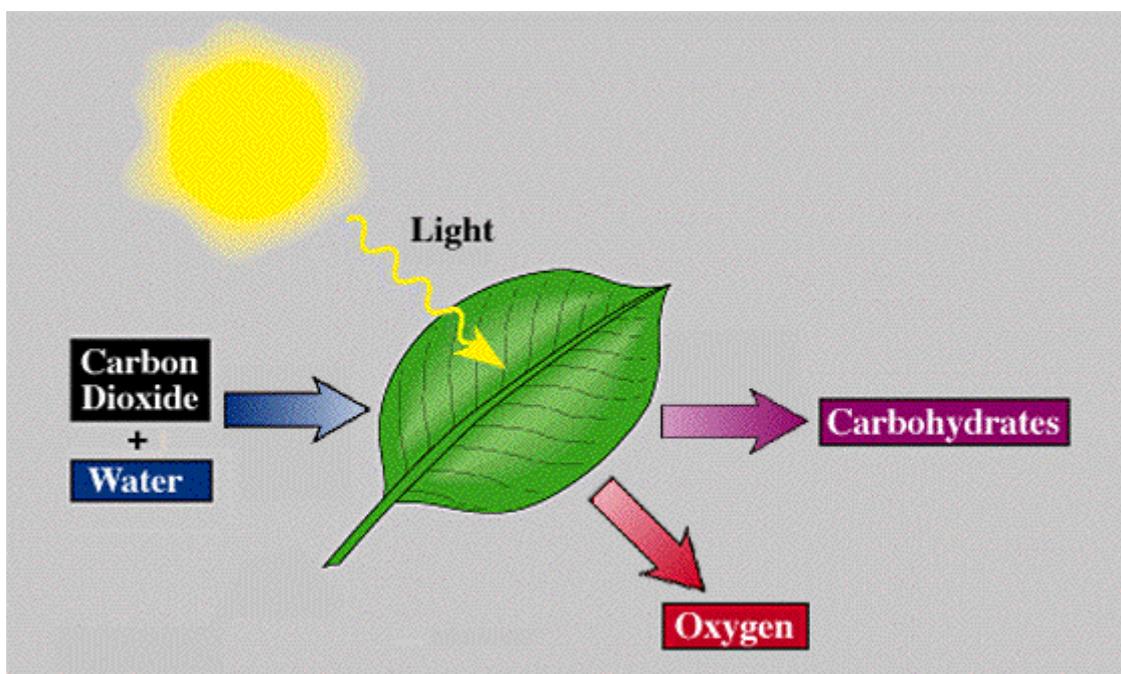
We were told that it is quite difficult to define what 'life' is. As Jan said, the life we know is based on Carbon and Water. A possible contender could be Silicon but he said carbon attaches itself to all sorts of things whereas silicon doesn't. Water is also very important as a medium to life. We were told that there is one other possible contender on other planets and that is ammonia.

Very basically, life as we know it is self-organising, reproduces itself and is also capable of evolution.

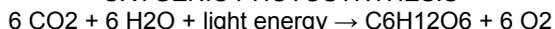
Jan turned next to the origins of the solar system and of the Earth in particular, saying it may be possible that life began as early as 3.5 billion years ago but asked how did life start on Earth. A number of experiments have been conducted. One of them was to place gasses thought to be around at that time in a flask and passed an electrical discharge through them. After several weeks, complex chemicals such as amino acids had formed although exactly how is not known, but these chemicals are essential for life.

There are other theories such as life may have arrived via meteorites or formed around volcanic vents. Water is essential and is thought to have arrived on comets. We were asked how much of the Earth is made up of water. The answer is about 0.02%, despite two thirds of the surface being covered by it.

In the early part of Earth's history, life was dominated by bacteria and this dramatically changed the environment mainly through the production of oxygen.



#### OXYGENIC PHOTOSYNTHESIS



*The first photosynthetic microorganisms probably used reducing agents such as hydrogen or hydrogen sulphide as sources of electrons, rather than water, and did not evolve oxygen*

Many significant factors were essential to life as we know it, such as a stable sun, the presence of suitable elements, the right amount of gravity to retain the atmosphere and we are in what is known as the habitable zone where we orbit the Sun at just the right distance to allow water to exist.

We have greenhouse gasses that help keep the average temperature up and the Earth's magnetic field helps to protect us from cosmic radiation in the solar wind. Also volcanism and plate tectonics help regulate the amount of carbon dioxide in the atmosphere and so stabilise the climate.

We have a Moon that is large enough to produce the tides which are so important to the development of life. Also it is thought that the huge gas planets, particularly Jupiter, have been responsible for keeping asteroids and comets away from hitting the Earth.

Returning to evolution, Jan said there were theories by some scientists, suggesting that evolution on the Earth has not been linearly progressive but may be caused by sudden events such as the arrival of the meteor that wiped out the dinosaurs leaving smaller mammals to prosper. Evolution is certainly not predictable.

Mars is that much further from the Sun than we are, has less mass than the Earth and lost any atmosphere and water earlier in the planets existence. It lost any magnetic field it had and has no plate tectonics. It is a dead planet, although Jan said Mars may have once been quite different possibly with water and may even have had life.

There has always been speculation that there was once life on Mars. In the 19<sup>th</sup> century, astronomer Percival Lowell thought he could see canals through his telescope and there was some thought that dark areas on the surface could have been vegetation.

In 1984 a meteorite found in the Earth's Antarctic was established through its chemical structure and trapped gasses within it to have come from Mars and was thought to have contained a microscopic bacteriological type structure but this was later discounted. Yet missions to Mars have discovered evidence in rocks that water may once have been present, so life may have been present a long time ago.

Jan talked about other possible places in the Solar system that might have some form of life such as Encelodus, Europa, Titan and Io and later this year, the Rosetta mission will hopefully rendezvous with a comet, releasing a lander which is intended to determine any form of amino acids.

The search for life goes on and using incredibly sensitive devices and methods that were explained to us, astronomers are successfully finding exoplanets around stars. About a thousand have so far been detected. We were told that detecting methods are becoming so sensitive that it may soon be possible to identify gasses within the atmosphere of certain exoplanets and could suggest the possibility for life.

Jan concluded his thought provoking talk by mentioning the Fermi Paradox which asks "If life does exist elsewhere, where are they?." The Drake equation (1961) calculates in broad terms, the chance for life to exist elsewhere. He quoted from S. J. Gould; "On Earth, bacteria represent the great success story of life's pathway – they are adaptable, resilient and diverse. Unlike other forms of life, we cannot imagine how human induced changes might threaten their extinction".

The discussion of intelligent life was brought to an abrupt end when Jan showed a slide of a drunk in Tunbridge High Street a little while ago!

## **Snippets from the Scientific World**

*John Wayte*

### **Moon Greenhouse**

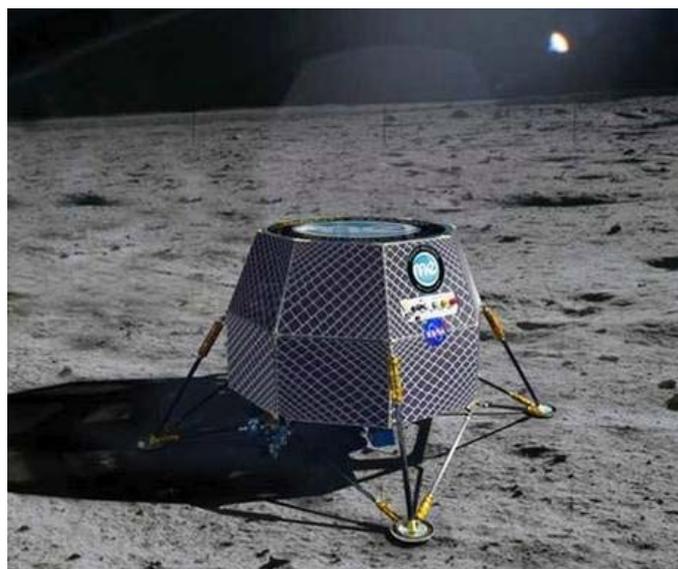
NASA has announced plans to grow plants on the moon by 2015 in a project designed to further humanity's chances of successfully colonizing space.

If successful, the Lunar Plant Growth Habitat team will make history by seeding life from Earth on another celestial body for the first time, paving the way for humans to set up a more permanent habitation. "If we send plants and they thrive, then we probably can" says NASA.

Scientists, contractors and students will work together to create a small 1-kg 'self-contained habitat' containing seeds and germination material to send to the moon.

"After landing in late 2015, water will be added to the seeds inside the module and their growth will be monitored for 5 to 10 days and compared to Earth-based controls. Seeds will include Arabidopsis, basil and turnips" said NASA officials in a press release.

Arabidopsis is a small flowering plant related to the Brassicaceae family (cabbage/mustard to you and me) and is the first plant to have its entire genome sequenced so changes in this strange environment can be easily observed.



*What the plant module may look like*

Getting the seeds to the moon will be accomplished via the help of the Moon Express Lander, a spacecraft being built by the private company, Moon Express, to compete in the Google Lunar X Prize. The \$20 million prize will be awarded to the first team to land a robot on the surface of the moon, travel 500 metres over the lunar surface and send images and data back to Earth, with a deadline of 31<sup>st</sup> of December 2015.

## Mars Comet

So, planning ahead – what are you doing on the 19<sup>th</sup> of October at about 18.51? Well, there is about a 1 in 8,000 chance that Mars will be hit by a huge comet called C/2013A1 – it is also known slightly more romantically as the ‘Sliding Spring Comet’ after the observatory in New South Wales.

While there is a small chance that it would hit Mars, the debris shower from the comet’s corona may be spectacular. How much you would see from Earth is very difficult to estimate at the moment. Almost certainly you will see something.

One of the worrying factors is the number of Rovers and other surface based spacecraft together with the orbiting and other satellites already on their way to Mars. How resistant will they be to this very heavy bombardment of debris? Only time will tell.

If by chance the comet hits Mars then its explosive force will be about one third of the comet that wiped out the Earth’s dinosaurs or 80,000,000 times the power of the Russian event last year.

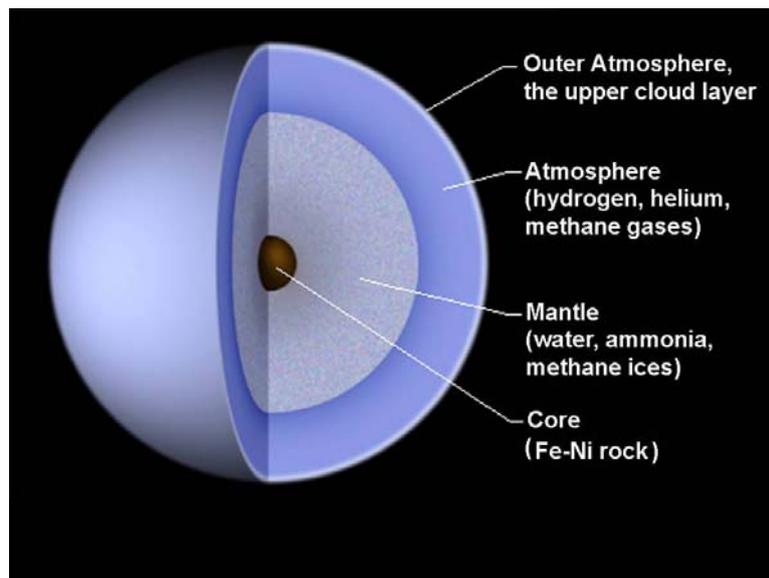
## Talks for beginners No. 10 – Uranus

Brian Mills

Brian’s talks about the planets has brought us to Uranus, the 7<sup>th</sup> planet from the Sun at a distance of about 20 Astronomical Units (20 times the distance of the Earth from the Sun) so that the effect of the Sun on Uranus is only about 1/400<sup>th</sup> of that on Earth.

It is one of the ice gas giants, the other being Neptune. Because of the fast rotation of Uranus, it is slightly oblate with an equatorial diameter of 25, 559 Km and polar diameter of 24, 573 Km. Its orbit has an eccentricity of about 0.44 and a day lasts 17 Earth hours and 14 minutes orbiting the Sun in 84 Earth years. Unusually for planets in the Solar system the axial tilt is 97.7° with a huge difference between the angle of rotation and the axis of the magnetic poles.

Brian told us that the ferrite core is about half of an Earth mass surrounded by the mantle composed of water, ammonia and methane in the form of ice. The atmosphere is made up of hydrogen, helium, and methane gas with the upper atmosphere mainly methane clouds.



*Inside Uranus*

The visual magnitude varies somewhere between 5.3 and 5.9; something close to the edge of human eye visibility and is just over 4 arc-seconds in diameter.

Uranus we were told was first noted by Flamsteed in 1690 but it was recorded as a star. Le Monnier spotted it in about 1750 over several years but still thought it a star. Herschel recorded it in 1781 but initially thought it was a comet. Lexell, a Russian with a good knowledge of Spherical Trigonometry was the first to compute the positions and realised it had to be the orbit of a planet around the Sun.

It is reported that in 1789 Herschel saw rings around Uranus and even saw colours which has since been confirmed but this has been discredited because no-one believes that his eyes and telescope could have been that good, although Brian said, one of the brighter rings known today is in the place where Hershel noted.

In 1977 a telescope was set up aboard an aircraft by the Kyper Airborne Observatory (KAO) and they recorded an occultation of Uranus and actually detected three rings as the planet passed in front a the star. KAO was superseded by the Stratospheric Observatory For Infrared Astronomy (SOFIA) which used a larger telescope, observations being made through the Coude focus to

allow bigger instruments to be attached. Today, together with results from the Hubble telescope, 13 rings are currently known. The outermost ring is calculated as being 196 Km in diameter.

Brian then looked at the moons of the planet. At present 27 moons are known, Herschel himself having found 2 in 1787.

Not much in the way of space missions has involved Uranus. There was a flyby in 1986 by Voyager 2 but nothing since.

Brian followed this with the March Sky Notes which follow later in the Newsletter.

### **MARCH MEETING**

**Wednesday 19<sup>th</sup> March 2014** – Dr. David Whitehouse talks about the “The Next 50 Years of Space Travel.” David Whitehouse was the BBC Science Correspondent from 1988 to 2006 and has written a number of books on various scientific subjects. Meetings begin at 1930 although members are invited to arrive anytime after 1900 as this is a good time to exchange ideas and discuss problems and also relax before the meeting starts.

The venue as always is the Upper Room of the Methodist Church at the east end of Wadhurst Lower High Street, almost opposite the entrance to Uplands College. (For those with SatNav – the post code is TN5 6AT)

Anyone is welcome but non-members are asked if they wouldn't mind contributing £3 towards costs.

### **FUTURE MEETINGS**

**Wednesday 16<sup>th</sup> April 2014** – Stephen Tonkin will be giving a talk called “Ten Ways in Which the Universe Tries to Kill You”

**Wednesday 21<sup>st</sup> May 2014** – Our own Eric Gibson is talking about “Messier”

**Wednesday 18<sup>th</sup> June 2014** – The Society's Telescope Evening

**Wednesday 16<sup>th</sup> July** – Our Chairman John Vale-Taylor is giving a talk he calls “Cameras to Telescopes”

Late August we will be holding our annual barbecue. Details to follow.

### **ANNUAL SUBSCRIPTIONS**

We have now entered the Society's new session, but this year we have had to increase the subscriptions. Membership for the year is now £16 and £23 for two members within the same family at the same address. Children and students under 17 remain free and are always welcome.

Subscriptions can be made at the meetings, preferably by cheque payable to “Wadhurst Astronomical Society” or can be posted to our Treasurer;

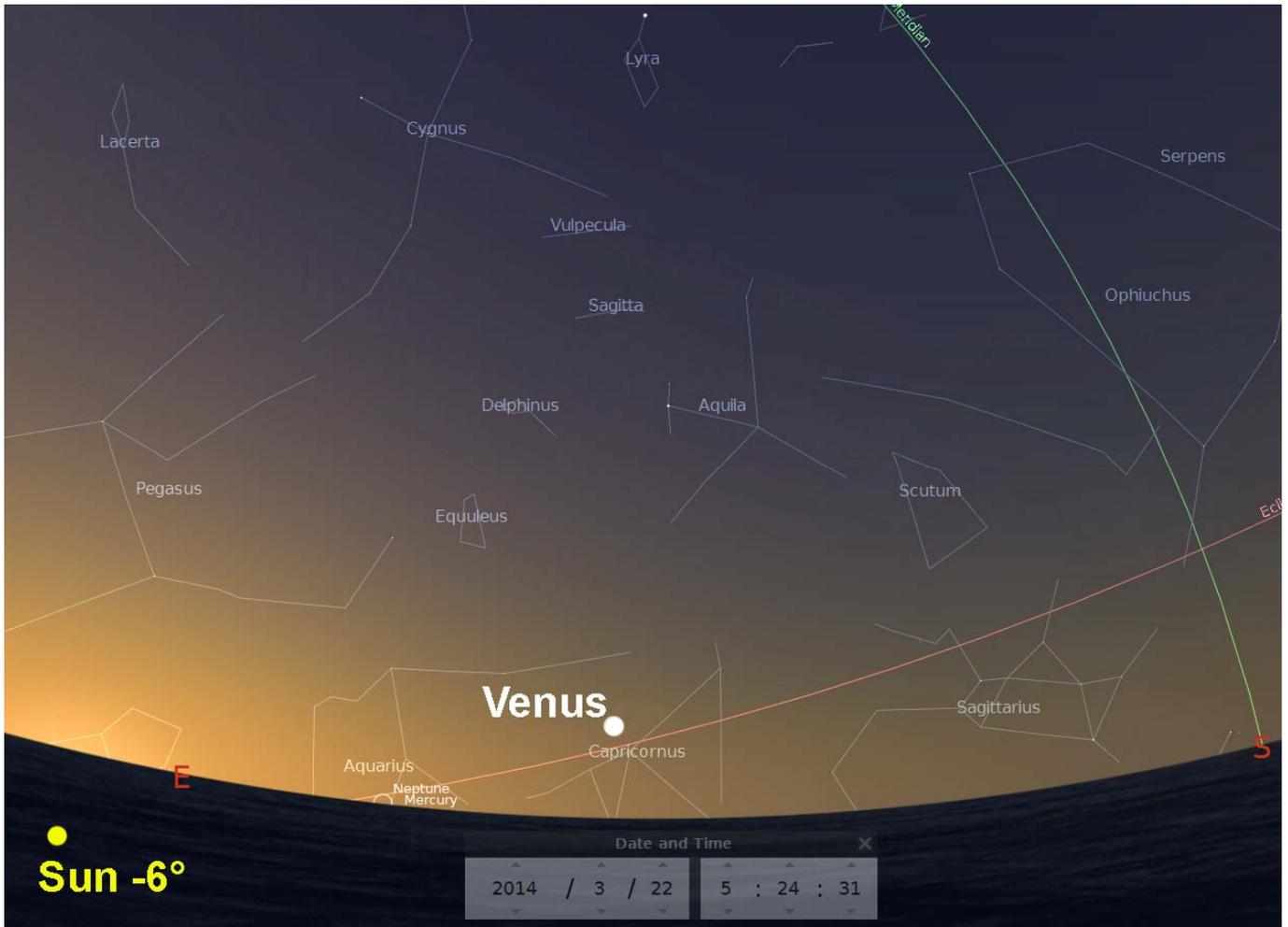
**Michael Wyles at:  
31 Rowan Tree Road  
Tunbridge Wells  
Kent  
TN2 5PZ**

### **SKY NOTES FOR MARCH 2014**

#### **Planets**

Mercury is a morning object, but sadly is so poorly positioned as seen from these latitudes, that it is to all intents and purposes unobservable. The problem is that in the early mornings at this time of year the ecliptic makes a very shallow angle with the horizon. Even when Mercury is at greatest elongation on the 14<sup>th</sup> of the month it is less than one degree above the horizon at the start of civil twilight. The best morning apparitions will occur in July and November, whilst the planet's best evening showing will be in May.

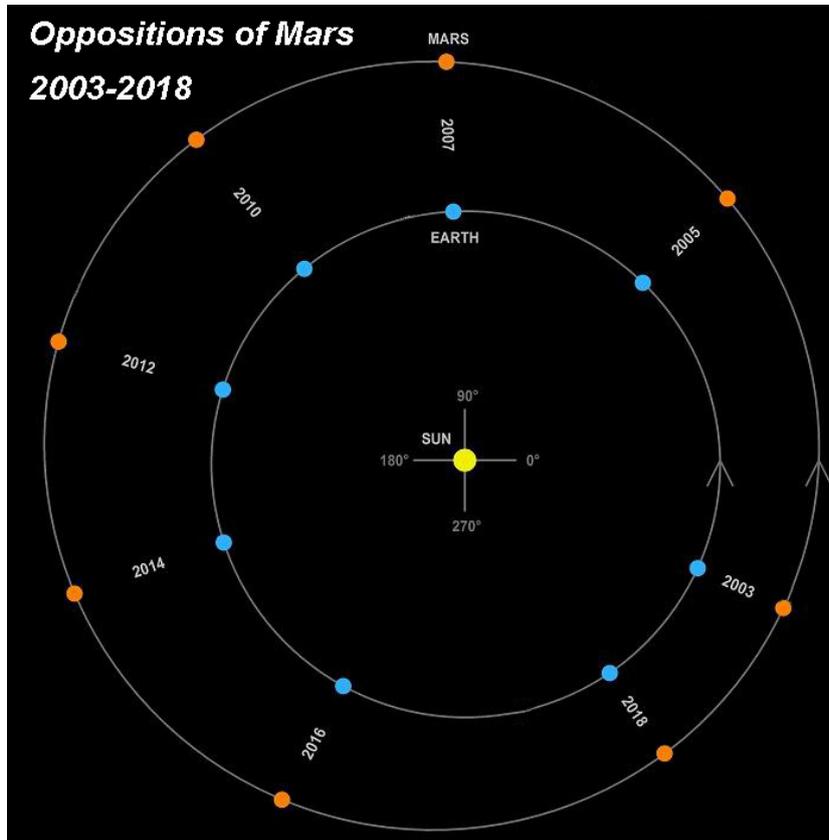
Venus is a brilliant morning object at magnitude -4.3, although it also suffers from a lack of altitude due to the position of the ecliptic as mentioned above.



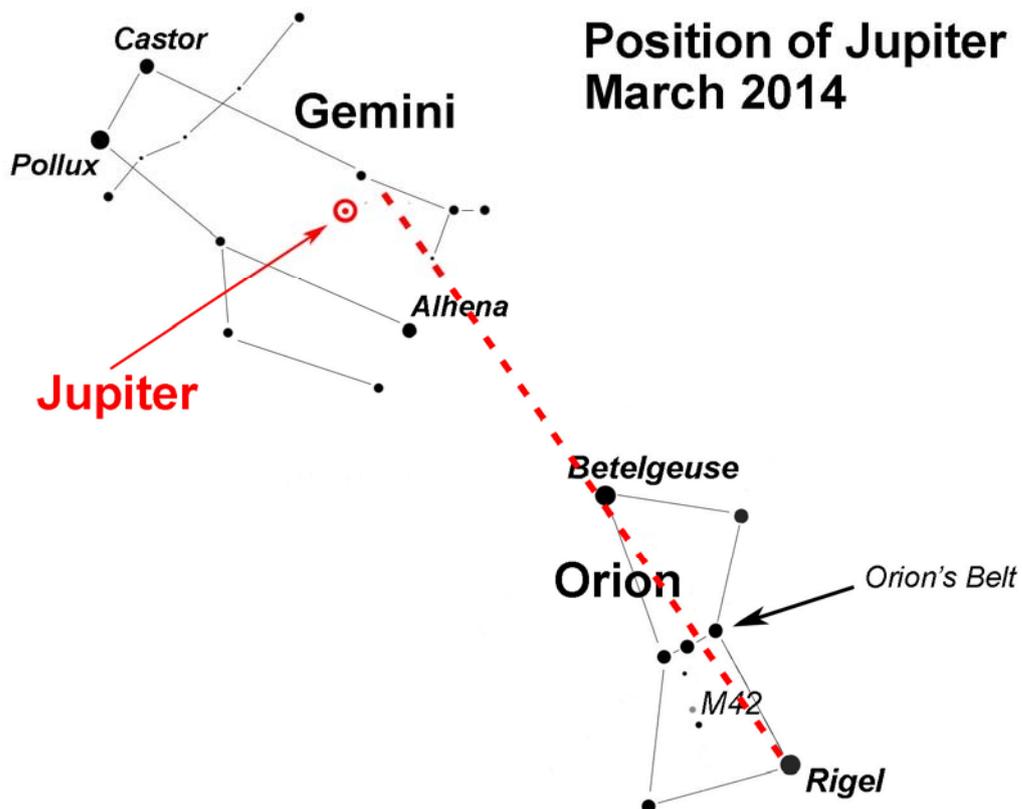
It reaches greatest western elongation on the 22<sup>nd</sup> of the month when, with the Sun 6° below the horizon, the planet will be 8° high in the south east. After this Venus gradually moves back towards the Sun and finally suffers a superior conjunction on October 25<sup>th</sup>.

Earth reaches the Spring Equinox on March 20<sup>th</sup>. This is the time when we consider that day and night are of equal length. This is a rather simplistic definition because the equinox occurs at a particular moment in time (16.57 hrs on this occasion) and refers to the moment when the plane of the Earth's equator is in line with the centre of the Sun. At that moment the axis of the Earth points neither towards, nor away from, the Sun.

Mars rises just before 22.00 GMT as the month begins, and by the end this has become 20.30 BST. The planet reaches its first stationary point on the 1<sup>st</sup>, after which it moves slowly retrograde (east to west) until May when it resumes direct motion once more. It lies close to the bright star Spica in Virgo, a constellation that it currently shares with the two minor planets (1)Ceres at magnitude +6.9 and (4)Vesta at magnitude +5.8. The gibbous Moon lies close to Mars and Spica on the 18<sup>th</sup> of the month. Mars continues to grow in apparent size to 14.7", whilst its brightness increases to -1.3 as it moves towards opposition on April 8<sup>th</sup>. There was no opposition of Mars during 2013 because the three bodies, The Sun, Earth and Mars, only line up every 790 days on average. As you can see from the diagram of successive oppositions, the distance the bodies are apart varies so that some oppositions are more favourable than others. This is because both the Earth and Mars have slightly elliptical orbits, with that of the "Red Planet" being considerably more so than that of the Earth. The most recent close approach of Mars was in 2003 when it was 55,758,006 km from us which was the closest the two bodies had been for around 60,000 years. There were highly exaggerated stories in the media that Mars would appear as large as a full Moon!



Jupiter may be past its best but it is still a brilliant evening object in the constellation of Gemini. On the first of the month it transits, due south, at 20.00 GMT with an altitude of 62°. During March its magnitude drops slightly from -2.4 to -2.2 and its angular size falls to 39". The planet has been moving retrograde, but it reaches its second stationary point on March 6<sup>th</sup> after which it continues direct motion, from west to east. If you are in any doubt about locating Jupiter, the easiest way to find it is to draw a line through the two corner stars in Orion, Rigel and Betelgeuse, and continue it northwards and eastwards into Gemini. The line will pass close to the gas giant as shown in the diagram.



Saturn rises a little after midnight GMT as March begins but by the end of the month this has become 23.15 BST. It also reaches a stationary point in March, in this case on the 3<sup>rd</sup>, after which it moves retrograde until July. The planet is brightening very gradually and its apparent angular diameter is also growing as it approaches a May opposition. Saturn spends the whole of this month in Libra and has the gibbous Moon for company on 21<sup>st</sup>. On that morning the two bodies can be found on the meridian due south at 03.30 GMT.

### Lunar Occultations

In the table below I've listed events for stars down to magnitude 7.0 that occur before midnight although there are many others that are either of fainter stars or occur at more unsociable hours. DD = disappearance at the dark limb. The column headed "mm" (millimetres) shows the minimum aperture telescope required for each event. **Times are in GMT.** Please remember that the Society has telescopes that members can borrow, all of which are suitable for the following events.

Mar.	Time	Star	Mag	Ph	Alt °	% illum.	mm
3 <sup>rd</sup>	20.15	ZC 272	5.9	DD	16	15	40
6 <sup>th</sup>	21.01	ZC 527	6.2	DD	28	33	40
7 <sup>th</sup>	17.07	ZC 658	4.3	DD	57	42	80
7 <sup>th</sup>	19.41	SAO 93963	6.9	DD	47	43	60
7 <sup>th</sup>	21.57	XZ 70265	7.0	DD	29	43	60
7 <sup>th</sup>	21.57	ZC 684	6.2	DD	29	43	40
9 <sup>th</sup>	18.46	ZC 934	6.4	DD	57	62	60
9 <sup>th</sup>	21.45	ZC 951	6.6	DD	45	63	60

### Phases of the Moon for March

New	First ¼	Full	Last ¼
1 <sup>st</sup>	8 <sup>th</sup>	16 <sup>th</sup>	24 <sup>th</sup>
30 <sup>th</sup>			

### ISS

There are no evening passes of the International Space Station this month that are visible from the South East. The details of all passes, including those visible after midnight, can be found at [www.heavens-above.com](http://www.heavens-above.com)

### Iridium Flares

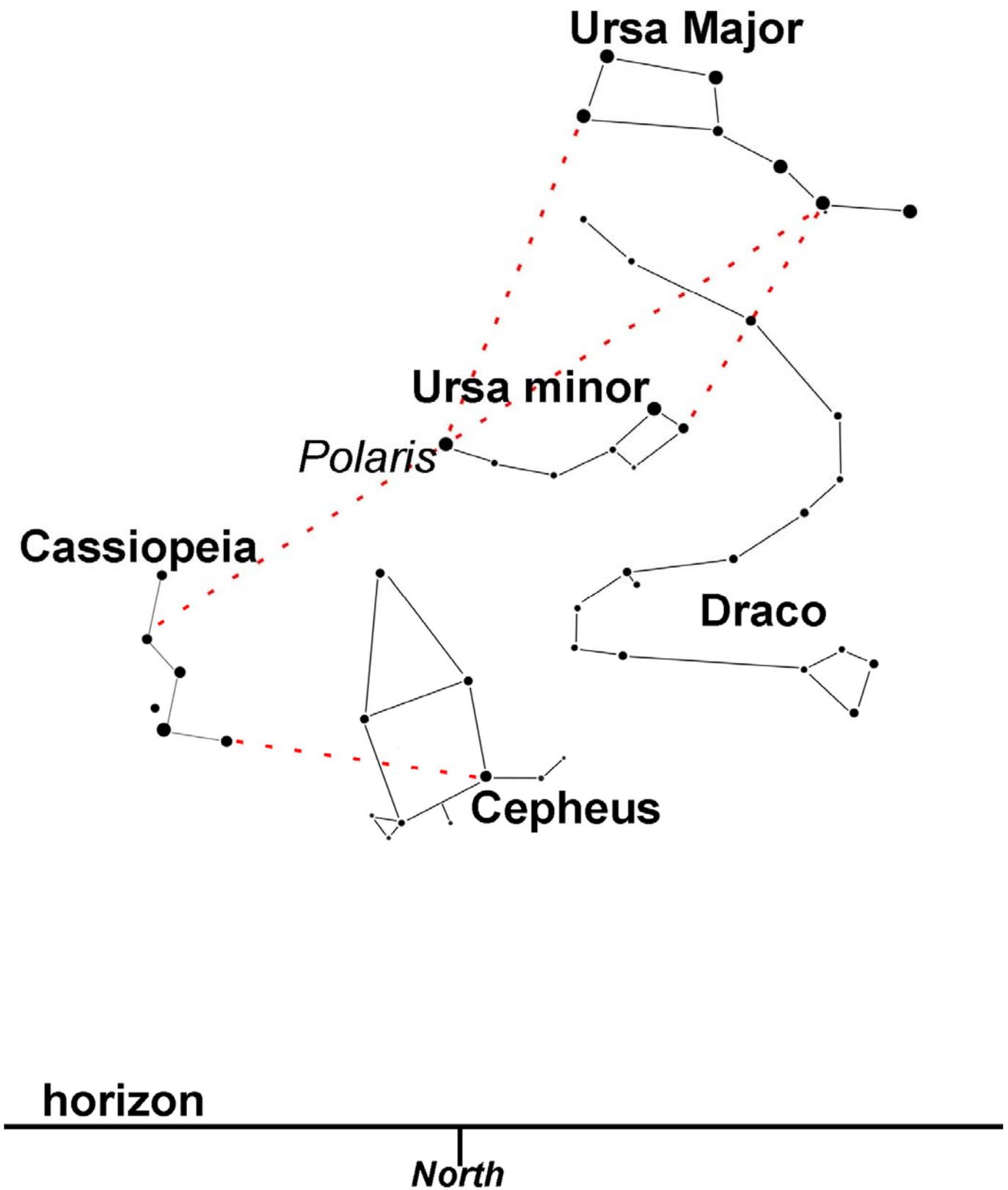
The flares that I've listed are magnitude -2.0 or brighter although there are a lot more that are fainter or occur after midnight. If you wish to see a complete list, or obtain timings for somewhere other than Wadhurst, go to [www.heavens-above.com](http://www.heavens-above.com) Remember that when one of these events is due it is sometimes possible to see the satellite before and after the "flare", although of course it will be much fainter at those times. **Times are in GMT with the exception of the last event, marked with an asterisk, which is in BST.**

Mar.	Time	Mag.	Alt°	Az.°		Mar.	Time	Mag.	Alt°	Az.°
1 <sup>st</sup>	20.25	-3.5	11	6 (N)		24 <sup>th</sup>	20.45	-5.4	10	360 (N)
2 <sup>nd</sup>	20.18	-3.8	15	6 (N)		25 <sup>th</sup>	21.27	-2.6	11	36 (NE)
3 <sup>rd</sup>	20.12	-6.3	18	7 (N)		26 <sup>th</sup>	21.31	-6.3	14	40 (NE)
4 <sup>th</sup>	20.05	-5.3	21	7 (N)		28 <sup>th</sup>	21.28	-3.0	17	45 (NE)
12 <sup>th</sup>	19.24	-4.2	37	5 (N)		29 <sup>th</sup>	21.32	-3.1	20	48 (NE)
13 <sup>th</sup>	19.18	-5.5	39	6 (N)		31 <sup>st</sup>	21.29 *	-3.4	24	52 (NE)
22 <sup>nd</sup>	18.32	-5.1	54	358 (N)						

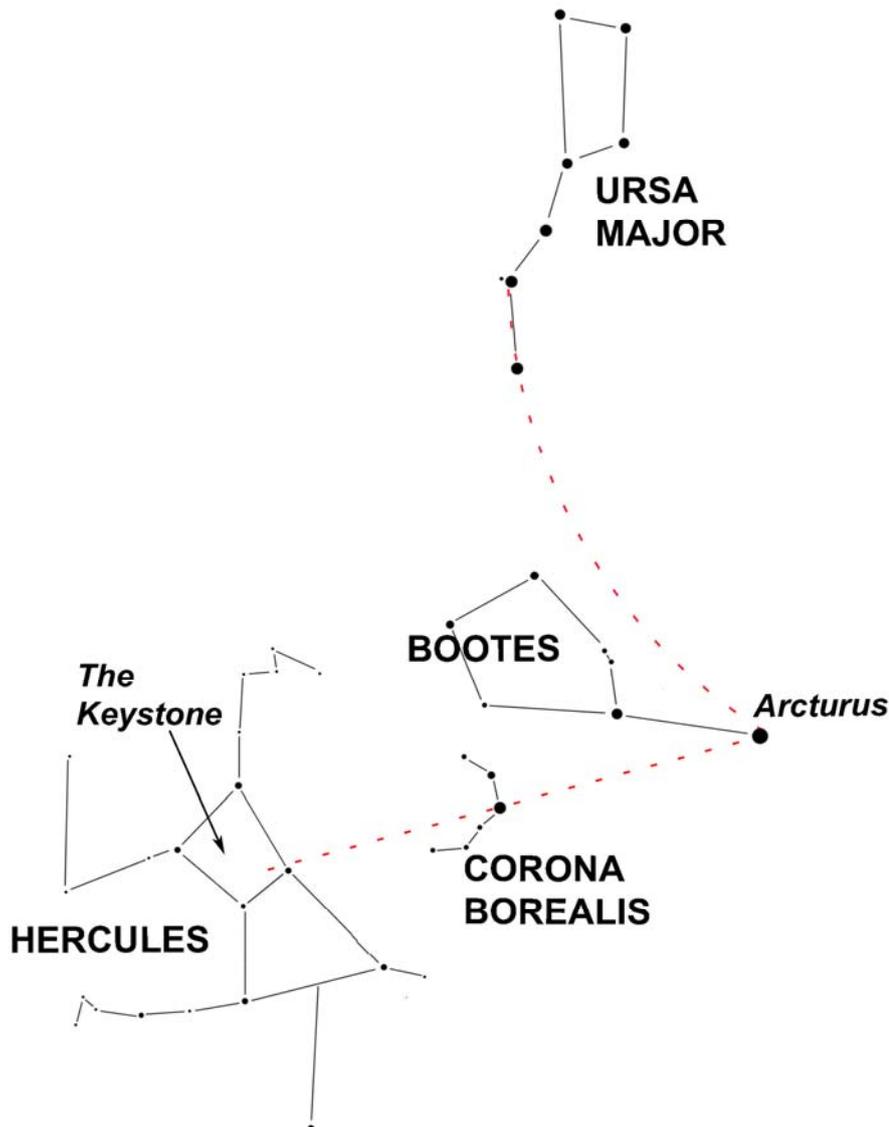
### The Night Sky in March (Written for 22.00 hrs GMT mid month)

If you have a good view to the north, you may just be able to see two of the stars that form the Summer Triangle close to the horizon. Vega in Lyra appears to be considerably brighter than Deneb in Cygnus but that is to be expected because not only is Vega comparatively close to us (25 light years away) it is also around 40 times more luminous than our own Sun. Deneb, by comparison, is 2,500 light years distant but is thought to be in the order of 150,000 times brighter than the Sun.

Ursa Major is approaching the zenith whilst his smaller namesake points towards the constellation of Draco that lies to the east.



The map shows how to use Ursa Major to find Polaris (the Pole Star) and some of the other circumpolar constellations. Looking east some of the summer groups are now becoming visible. Boötes, Hercules and Corona Borealis have all risen. Hercules is one of the fainter constellations, but it is easier to locate if you use Ursa Major to find Arcturus first and then draw a line from it through the brightest star in Corona Borealis. The body of Hercules is made up of two quadrilaterals, one of which is known as the "Keystone" due to its shape.



Towards the south we find the constellations of Leo and Cancer either side of the meridian. Just below Cancer lies the head of Hydra, the water snake, whose body twists and turns all the way to the south eastern horizon. On his back we find the small groups of Crater (the cup) and Corvus (the crow).

Moving to the west, the striking groups of winter and making their way towards the horizon although Orion and his entourage are all still visible. The celestial twins, Castor and Pollux are still some 60° in altitude with Capella approximately 50°. Perseus is also at a reasonable altitude to allow the double cluster that lies between him and Cassiopeia, to be found.

The two clusters in the double are more correctly known as NGC 869 and NGC 884 although in some works they are referred to as h and χ (chi).

#### **Advance warning for April**

8<sup>th</sup> APRIL - Mars at opposition.

#### **National Astronomy Week - March 1<sup>st</sup> - 8<sup>th</sup>**

As part of the NAW the Campaign for Dark Skies (CfDS) and The Campaign to Protect Rural England (CPRE) are running a "Star Count" again to assess the effects of light pollution. There is more information, plus full instructions on what to do at <http://www.astronomyweek.org.uk/>

Observers are required to count the number of stars visible to the naked eye in an area of sky bounded by the four corner stars in Orion, before March 8<sup>th</sup>, and then report the result to the CPRE at the address given on their instructions.

Wadhurst Astronomical Society hope to hold an observing evening at Uplands College as part of the NAW and have set aside two dates in order to give us a better chance of clear skies. The dates are Thursday 6<sup>th</sup> and Friday 7<sup>th</sup> March when there is a lunar occultation to observe on both evenings plus there will be constellation recognition and telescopes for observing Jupiter. If you wish to take part please let Brian know either on the phone number below or at [brian@wkrcc.co.uk](mailto:brian@wkrcc.co.uk)

#### **Observing and Astrophotography Evenings**

All of the evenings that were arranged during January and February were clouded out. New dates will be arranged providing there is sufficient interest from members.

**Graze Occultation.** This will take place on March 4<sup>th</sup>, with the event occurring at 20.15 GMT. We will be viewing it from South Essex. The Society has a number of telescopes and electronic stop watches that are suitable for this type of event and are available for members to borrow. Please let Brian know if you are interested in attending.

**Don't Forget** British Summer Time begins at 01.00 GMT on Sunday March 30<sup>th</sup>.

Brian Mills

## **NASA SPACE PLACE**

### **A Two-Toned Wonder from the Saturnian Outskirts**

By Dr. Ethan Siegel

Although Saturn has been known as long as humans have been watching the night sky, it's only since the invention of the telescope that we've learned about the rings and moons of this giant, gaseous world. You might know that the largest of Saturn's moons is Titan, the second largest moon in the entire Solar System, discovered by Christiaan Huygens in 1655. It was just 16 years later, in 1671, that Giovanni Cassini (for whom the famed division in Saturn's rings—and the NASA mission now in orbit there—is named) discovered the second of Saturn's moons: Iapetus. Unlike Titan, Iapetus could only be seen when it was on the west side of Saturn, leading Cassini to correctly conclude that not only was Iapetus tidally locked to Saturn, but that its trailing hemisphere was intrinsically brighter than its darker, leading hemisphere. This has very much been confirmed in modern times!

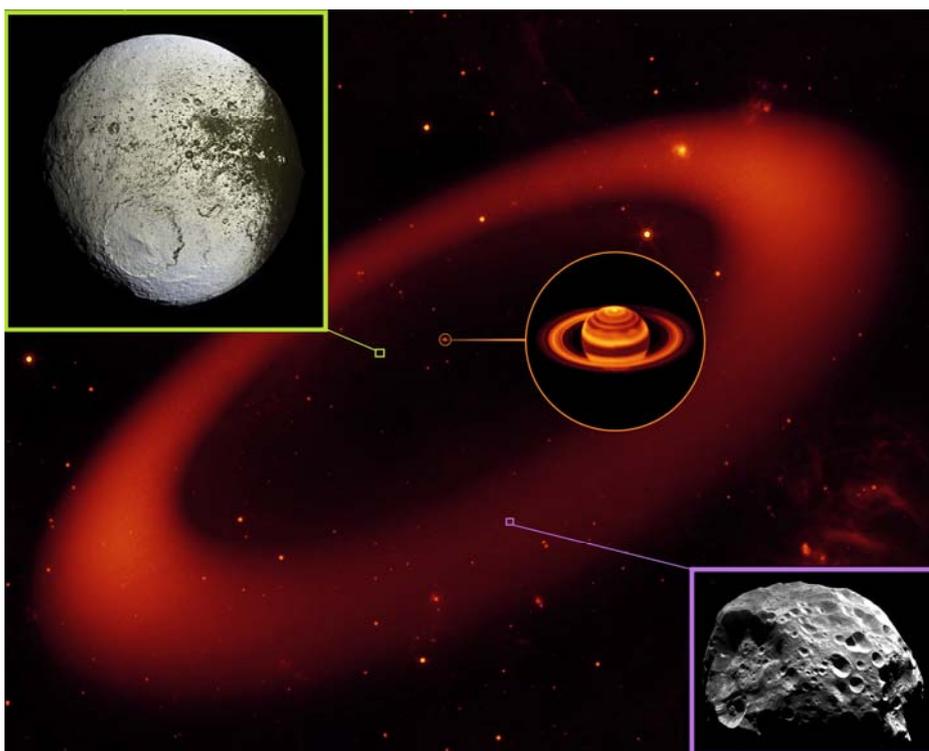
In fact, the darkness of the leading side is comparable to coal, while the rest of Iapetus is as white as thick sea ice. Iapetus is the most distant of all of Saturn's large moons, with an average orbital distance of 3.5 million km, but the culprit of the mysterious dark side is *four times* as distant: Saturn's remote, captured moon, the dark, heavily cratered Phoebe!

Orbiting Saturn in retrograde, or the opposite direction to Saturn's rotation and most of its other Moons, Phoebe most probably originated in the Kuiper Belt, migrating inwards and eventually succumbing to gravitational capture. Due to its orbit, Phoebe is constantly bombarded by micrometeoroid-sized (and larger) objects, responsible for not only its dented and cavity-riddled surface, but also for a huge, diffuse ring of dust grains spanning *quadrillions* of cubic kilometres! The presence of the "Phoebe Ring" was only discovered in 2009, by NASA's infrared-sensitive Spitzer Space Telescope. As the Phoebe Ring's dust grains absorb and re-emit solar radiation, they spiral inwards towards Saturn, where they smash into Iapetus—orbiting in the opposite direction—like bugs on a highway windshield. Was the dark, leading edge of Iapetus due to it being plastered with material from Phoebe? Did those impacts erode the bright surface layer away, revealing a darker substrate?

In reality, the dark particles picked up by Iapetus aren't enough to explain the incredible brightness differences alone, but they absorb and retain *just enough* extra heat from the Sun during Iapetus' day to sublimate the ice around it, which resolidifies preferentially on the trailing side, lightening it even further. So it's not just a thin, dark layer from an alien moon that turns Iapetus dark; it's the fact that surface ice sublimates and can no longer reform atop the leading side that darkens it so severely over time. And that story—only confirmed by observations in the last few years—is the reason for the one-of-a-kind appearance of Saturn's incredible two-toned moon, Iapetus!

Learn more about Iapetus here: <http://saturn.jpl.nasa.gov/science/moons/iapetus>

Kids can learn more about Saturn's rings at NASA's Space Place: <http://spaceplace.nasa.gov/saturn-rings>



Images credit: Saturn & the Phoebe Ring (middle) - NASA / JPL-Caltech / Keck; Iapetus (top left) - NASA / JPL / Space Science Institute / Cassini Imaging Team; Phoebe (bottom right) - NASA / ESA / JPL / Space Science Institute / Cassini Imaging Team.

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**Any material for inclusion in the April 2014 Newsletter should be with the Editor by March 28<sup>th</sup> 2014**