



TRANSIT

The Newsletter of



05 August 2007



Noctilucent clouds over Durham on 28th June 07. 00:10 BST from John and George Gargett

Editorial

Next meeting : Friday, September 14, 2007 subject and presenter to be announced by the Secretary in his Summer Newsletter. Location, Wynyard Planetarium

Letters to the Editor :

From John Crowther:-

Connections and questions

The 2007/2008 Newsletter from Neil provides an opportunity for us to look forward to future goodies.

Connections may be made between articles and there are three links in last month's Transit. For instance between the Analemma on the front cover, the Summer Triangle and the Summer Solstice article.

The Crimean Astrophysical Observatory must have had a lots of noonday suns as the analemma hasn't many gaps in it.

So the crossing point marks the equinoxes and the upper, smaller loop is traced when the Sun is furthest away and the Earth moves more slowly along its orbit. This contrasts with the bigger, lower loop where we are closer to the Sun and move at a faster rate. But there is much more than 3% difference between the loops so there must be another reason for this. How well the winter solstice shows up with its group of solar images. Here we see the standing-still effect at the winter solstice. But why is the analemma tilted? Is this caused by the latitude of the observatory?

There is also a connection between Bob's article on "Radio Astronomy" and "The Drake Equation is obsolete" article. Apparently Michael Crichton made a wrong conclusion that SETI was a religious endeavour searching for imaginary identities. So is Bob's sentence - "Some (planetary systems) must be inhabited and one day we will hear from one of them" - a statement of faith?

Back to the Drake equation article with its sentence "Even a negative sentence can be meaningful" (*absence of evidence isn't evidence of absence – SETI mantra, Editor*).

This may cause us to become full of our own importance as we consider our supposed uniqueness. It would be almost a return to the early cosmology of a central Earth round which everything revolves.

SETI reminds me of John Masefield's poem - "The Listeners". Here are some fragments with the three final words altered.

"Is there anybody there?" said the Traveller,
But only a host of phantom listeners
Stood listening to that voice from the world of men.

And he felt in his heart their strangeness,
Their stillness answering his cry 'neath the starred sky,
"Tell them I came and no one answered,
That I kept my word" he said.
And the silence surged softly backward,
When the **circling Spaceship disappeared.**

(Brrr! send shivers up your spine – Editor)

So "to respond or not to respond" that is the question, and will our television and radio broadcasts stop radiating into the Milky Way when digital takes over completely? (*will Gliese 581c or d still be on analogue?*). What profound pearls of wisdom will then be missed by any alien listeners.

Finally from the Andromeda Galaxy article. I'd like to live Andromeda Way but not in Milkymeda Avenue.

John

The oldest galaxy joke in the world... (continued)

M82 opens a pub in town and M83 drops in for a pint. "May I have a pint of your heavenly ale please", asks M83. "No" comes the reply, "you're barred!"

The oldest galaxy joke in the world (extended)...

M82 opens a pub in town and M81 and M83 drop in for a pint. "May I have a pint of your heavenly ale please", asks M83. "No" comes the reply, "you're barred!" So M83 turns to his friend and says "Eeh, isn't he peculiar..."

Mark Dubbeldam

*Any new observations, any comments on local or international astronomy, **anything** you want to share with your fellow members?*

Dear CaDAS members,

[Noctilucent clouds above Newcastle](#)

I wish you a nice and pleasant summer break. The pictures below show that even "white nights" are charming.

Those noctilucent clouds are 82 km above us - the highest known clouds on Earth, and no clue how water vapor gets there. They are quite structured, see the last image done with 300mm f.l. on my Canon 300D DSLR. As those clouds get more frequent in the last decades, they may be an indicator for global warming - albeit this is not proven yet.

Best wishes, Juergen Schmoll

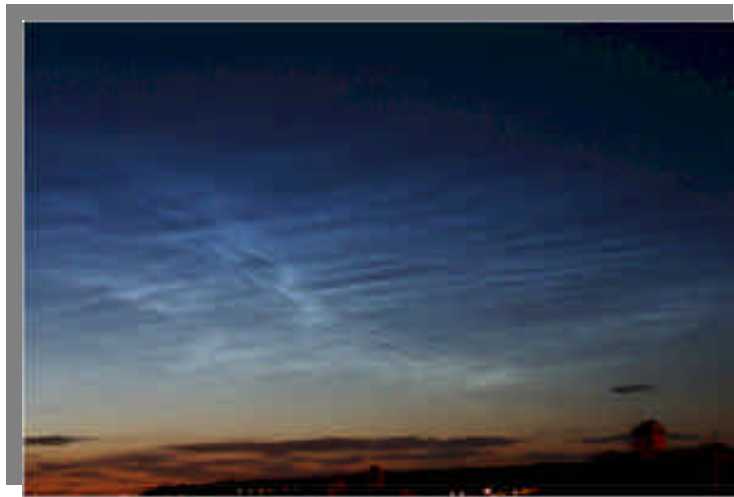


Fig 1 : 18mm f.l. on Canon 300D DSLR.

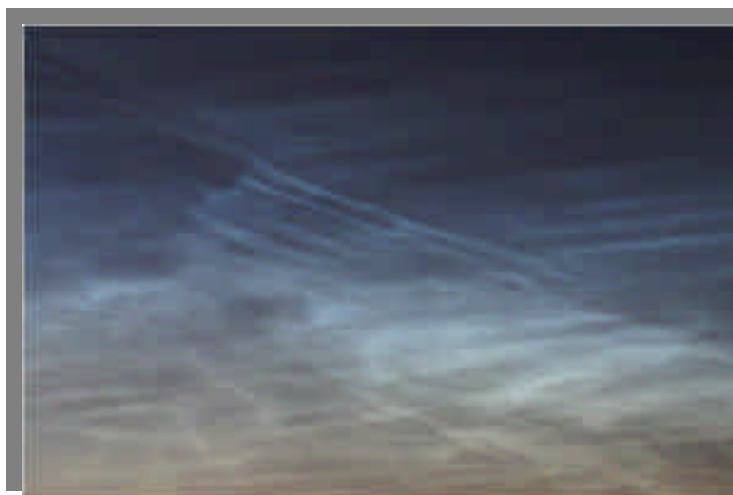


Fig 2 : 100m f.l. on Canon 300D DSLR.



Fig 3 : 300m f.l. on Canon 300D DSLR

Noctilucent clouds

Noctilucent clouds are the highest clouds in the sky at a height of about 50 miles, which puts them at the top of the mesosphere. These can only be seen during the summer between about 50 and 65 degrees north and south. At any higher latitude it doesn't get sufficiently dark enough to see them.

These clouds look very similar to high cirrus but are bluish or silver in colour and, like the nacreous clouds, are illuminated when the sun is below the horizon, in this case some 6 to 12 degrees

There has been a lot of speculation on what they are made up of and how they are formed, but most scientists now believe that they are made of water ice. But how do these ice particles exist in what should be the warmest part of our atmosphere, and how do they get there in the first place? The answer is probably gravity waves.

The jetstream or mountains that transfer the lower level momentum upwards often form these waves. These gravity waves can change the local temperature fields, as well as transport water vapour from below, and can actually produce some of the lowest temperatures in the atmosphere for a short period of time. Although, of course, temperature and heat has a totally different concept in this very rarified atmosphere than we experience at the surface of the Earth.

Life Under the Stars 3

from Dave Blenkinsop

We are now in the season of noctilucent clouds. We have had some so far this summer. What are noctilucent clouds? They are high altitude clouds at about eighty miles high in the mesosphere. It is at its coldest in northern summertime when ice crystals form.

If we look up into the northern sky in the short summer nights, we can sometimes see them forming silvery blue clouds. If we look with our binoculars we see them as rippled or striated clouds across the night sky. They can be photographed with an SLR camera using 400ASA film.

On Wednesday 27 June 2007 I took my 6" Dobsonian out into the yard to cool it down for a night's observing. At 11.00pm I looked up into the North and saw a noctilucent cloud. I phoned Steve Sawdon, John Fadian, Michael Gregory and Rob Peeling to let them know.

On Friday 29 June I did some observing with the 6" Dobsonian. I looked at Jupiter. Because it was so low in the sky I had to stand the telescope on a bench while I looked through the eyepiece standing on a pair of steps to see over the yard wall. Three moons were close together on the following side. I put the telescope in the back archway to look at Antares, I could not see its companion.

Back in the yard again. Middlesbrough Borough Council is clever, they placed a street light outside my backyard wall. They cannot stop a stargazer that easy! After I put a light shield on the shed to hide behind I looked at some nice double stars in Hercules. (Patrick Moore recounts one of his friends climbed a nearby lamppost and painted the glass black – the Council to this day haven't noticed – Ed.)

Me and the telescope looked at gamma Her 3.8 mag, 8.2 arcseconds separation; kappa Her 5 =6, yellow and gold; delta Her 3=8 nice; lambda an orange star; mu 3.8 = 9.5; sigma 5.9=5.9 nice; rho is a gem:

At 2:00am it was getting light, I put the telescope away then looked north and saw a noctilucent cloud. I put my 10 x 50 binoculars in a bag and walked down the street to find more northern sky. I observed some more doubles. Not bad for a night of the full moon.

More from Stargazer another time. Dave.

Eta Carinae – about to blow?

Eta Carinae is a mysterious, extremely bright and unstable star located a mere stone's throw - astronomically speaking - from Earth at a distance of only about 7,500 light years. The star is thought to be consuming its nuclear fuel at an incredible rate, while quickly drawing closer to its ultimate explosive demise. When Eta Carinae does explode, it will be a spectacular fireworks display seen from Earth, perhaps rivaling the moon in brilliance. Its fate has been foreshadowed by the recent discovery of SN2006gy, a supernova in a nearby galaxy that was the brightest stellar explosion ever seen. The erratic behavior of the star that later exploded as SN2006gy suggests that Eta Carinae may explode at any time.

Eta Carinae, a star between 100 and 150 times more massive than the Sun, is near a point of unstable equilibrium where the star's gravity is almost balanced by the outward pressure of the intense radiation generated in the nuclear furnace. This means that slight perturbations of the star might cause enormous ejections of matter from its surface. In the 1840s, Eta Carinae had a massive eruption by ejecting more than 10 times the mass of the sun, to briefly become the second brightest star in the sky. This explosion would have torn most other stars to pieces but somehow Eta Carinae survived.

X-ray emission is produced as material thrown off Eta Carinae rams into nearby gas and dust, heating gas to temperatures in excess of a million degrees.

This hot shroud extends far beyond the cooler, optical nebula and represents the outer edge of the interaction region. X-ray observations show that the ejected outer material is enriched by complex atoms, especially nitrogen, cooked inside the star's nuclear furnace and dredged up onto the stellar surface. Chandra observations also show that the inner optical nebula glows faintly due to X-ray reflection. The X-rays reflected by the optical nebula come from very close to the star itself; these X-rays are generated by the high-speed collision of wind flowing from Eta Carinae's surface (moving at about 1 million miles per hour) with the wind of the companion star (which is about five times faster)

The companion is not directly visible, but variability in X-rays in the regions close to the star signals the star's presence. Astronomers don't know exactly what role the companion has played in the evolution of Eta Carinae, or what role it will play in its future.

A neutron walks into a bar; he asks the bartender, 'How much for a beer?' The bartender looks at him, and says 'For you, no charge.'

Two atoms bump into each other. One says 'I think I lost an electron!' The other asks, 'Are you sure?', to which the first replies, 'I'm positive.'

[Do you know your galaxies from a bar of chocolate?](#)

The Galaxy Zoo team includes scientists from the University of Oxford, the University of Portsmouth and Johns Hopkins University (USA), and Fingerprint Digital Media of Belfast.

Astronomers are inviting members of the public to help them make major new discoveries by taking part in a census of one million galaxies.

Visitors to www.galaxyzoo.org will get to see stunning images of galaxies, most of which have never been viewed by human eyes before. By sorting these images into “spiral galaxies” (like our own Milky Way) or “elliptical galaxies”, visitors will help astronomers to understand the structure of the universe. The new digital images were taken using the robotic Sloan Digital Sky Survey telescope in New Mexico.

‘It’s not just for fun’ said Kevin Schawinski of Astrophysics at Oxford University where the data will be analysed. ‘The human brain is actually better than a computer at pattern recognition tasks like this. Whether you spend five minutes, fifteen minutes or five hours using the site your contribution will be invaluable.’ Visitors will be able to print out posters of the galaxies they have explored and even compete to see who’s the best virtual astronomer.

The galaxyzoo.org team were inspired by projects such as [Stardust@home](#), in which NASA invited the public to sort through dust grains obtained by a mission to Comet Wild-2. Oxford’s Dr Chris Lintott, co-presenter of the BBC’s Sky at Night programme and galaxyzoo.org team member, commented: ‘What the Stardust team achieved was incredible, but our galaxies are much more interesting to look at than their dust grains. We hope that participants in Galaxy Zoo will not only contribute to science, but have a lot of fun along the way.’

Images for the project are taken from the Sloan Digital Sky Survey, which uses a 142-megapixel digital camera to create the largest digital map of the universe. ‘It is great that digital archives we have built for science are now being used by the public to look at the universe’ says Professor Bob Nichol from the University of Portsmouth. ‘It will be great to have all the galaxies classified; it’s as fundamental as knowing if a human is male or female.’

The astronomers hope that the survey will shed light on how different kinds of galaxies are distributed across the sky. The results might even reveal that there is something fundamentally wrong with existing models of the universe.

Sir Patrick Moore, an enthusiastic supporter of the project, said: ‘Non-professionals have always been deeply involved in studying the sky and they now have yet another opportunity to make themselves really useful. Moreover, their help is now of immense value so do join up – as I am doing myself!’

Mars Rovers Caught in Severe Dust Storm

Having explored Mars for three-and-a-half years in what were missions originally designed for three months, NASA's Mars rovers Spirit and Opportunity are facing perhaps their biggest challenge.

For nearly a month, a series of severe Martian summer dust storms has affected the rover Opportunity and, to a lesser extent, its twin, Spirit. The dust in the Martian atmosphere over Opportunity has blocked 99 percent of direct sunlight to the rover, leaving only the limited diffuse sky light to power it. Scientists fear the storms might continue for several days, if not weeks. "We're rooting for our rovers to survive these storms, but they were never designed for conditions this intense," says Alan Stern, associate administrator of NASA's Science Mission Directorate, Washington.

If the sunlight is further cut back for an extended period, the rovers will not be able to generate enough power to keep themselves warm or operate at all, even in a near-dormant state. The problem is, Mars is a very cold planet, and the rovers depend on electric heaters to keep some of their vital core electronics warm.

Before the dust storms began blocking sunlight last month, Opportunity's solar panels had been producing about 700 watt hours of electricity per day, enough to light a 100-watt bulb for seven hours. When dust in the air reduced the panels' daily output to less than 400 watt hours, the rover team suspended driving and most observations, including use of the robotic arm, cameras and spectrometers to study the site where Opportunity is located.

On Tuesday, July 17, the output from Opportunity's solar panels dropped to 148 watt hours, the lowest point for either rover. On Wednesday, Opportunity's solar-panel output dropped even lower, to 128 watt hours.

NASA engineers are taking proactive measures to protect the rovers, especially Opportunity, which is experiencing the brunt of the dust storm. The rovers are showing robust survival characteristics. Spirit, in a location where the storm is currently less severe, has been instructed to conserve battery power by limiting

By Opportunity's 1,236th Martian day, which ended Tuesday, driving and all science observations had already been suspended. The rover still used more energy than its solar panels could generate on that day, drawing down its battery. "The only thing left to cut were some of the communication sessions," Callas said.

To minimize further the amount of energy Opportunity is using, mission controllers sent commands on Wednesday, July 18, instructing the rover to refrain from communicating with Earth on Thursday and Friday. This is the first time either of the rovers has been told to skip communications for a day or more in order to conserve energy. Engineers calculate that skipping communications sessions should lower daily energy use to less than 130 watt hours.

A possible outcome of this storm is that one or both rovers could be damaged permanently or even disabled. Engineers will assess the capability of each rover after the storm clears.

Stop Press:- Latest good-news update 24 July 2007

The twin rovers on Mars are in good shape today despite widespread dust storms that worsened last week and threatened to cut off solar power to the robotic explorers.

Steve Squyres of Cornell University, the lead scientist for the Mars Exploration Rovers (MER) project, said that both Spirit and are in "excellent shape" based on a radio transmission received this morning.

"Both came through the weekend beautifully," Squyres said in a telephone interview. "They were both power positive over the weekend, meaning they were generating more power than they were consuming."

The amount of sunlight penetrating the dust-choked martian atmosphere has increased slightly in recent days, and the batteries of both rovers are fully charged, said Michael Meyer, lead scientist for the Mars Explorations Program at NASA Headquarters in Washington, D.C. ***Mars Rover fans watch this space!!***

Brian May looks to sky to complete PhD

Guitarist Brian May is to spend two days studying the night sky in the Canary Islands as he completes the PhD he abandoned in 1971 to join Queen.

May is going to La Palma to observe the formation of "zodiacal dust clouds". The subject forms the basis of a thesis for London's Imperial College, where he had been studying before deciding to pursue a career with the rock group.

The 60-year-old recently published a book on astronomy with The Sky at Night presenter Sir Patrick Moore. May is basing himself at the Observatory of the Roque de Los Muchachos on the island of La Palma.



A statement issued on behalf of the facility said he had chosen this location because of the "quality of the sky" and the opportunity to use a 3.6-metre optical telescope, "which allows astronomers to study extremely faint objects".

May is also preparing a concert to mark the inauguration of another telescope at the observatory. He will present his thesis, which he has been preparing for across much of the past year, to Imperial College "within a fortnight".

A number of academics will question him about his work before any doctorate is awarded, a spokeswoman said.

The Perseid Meteor Shower Sunday, August 12th 2007

"It's going to be a great show," says Bill Cooke of NASA's Meteoroid Environment Office at the Marshall Space Flight Center. "The Moon is new on August 12th--which means no moonlight, dark skies and plenty of meteors." How many? Cooke estimates one or two Perseids per minute at the shower's peak.



Above: A Perseid fireball photographed August 12, 2006, by Pierre Martin of Arnprior, Ontario, Canada.

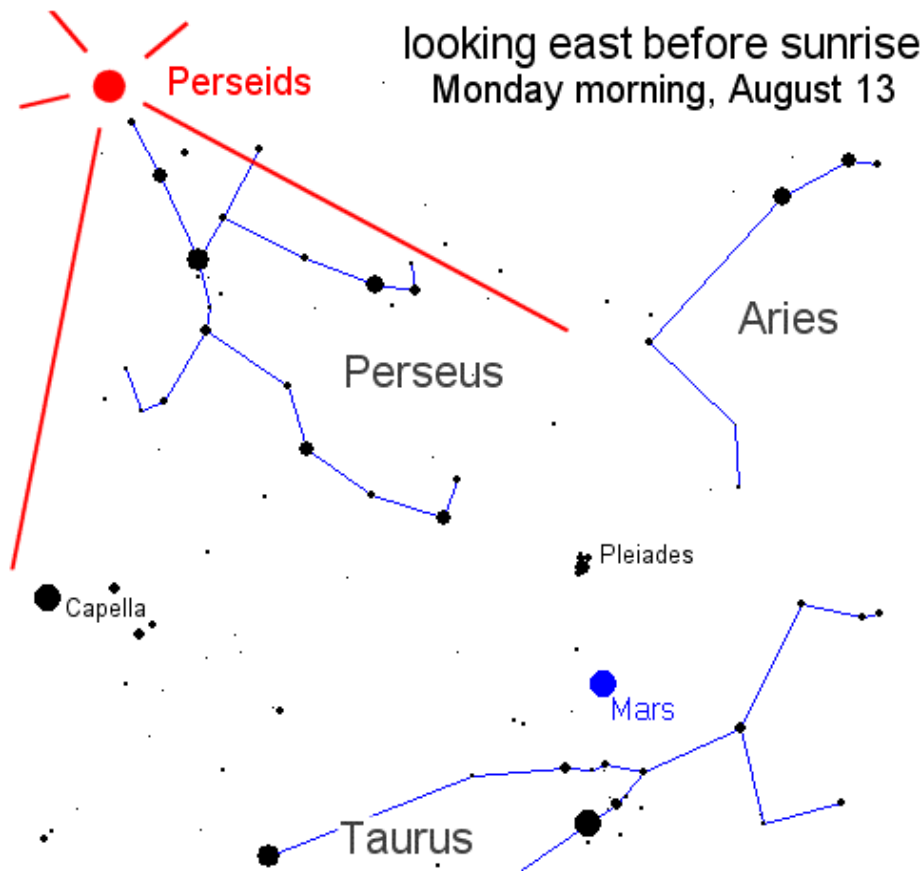
The source of the shower is Comet Swift-Tuttle. Although the comet is nowhere near Earth, the comet's tail does intersect Earth's orbit. We glide through it every year in August. Tiny bits of comet dust hit Earth's atmosphere traveling 132,000 mph. At that speed, even a smidgen of dust makes a vivid streak of light--a meteor--when it disintegrates. Because Swift-Tuttle's meteors fly out of the constellation Perseus, they are called "Perseids."

The show begins between 9:00 and 10:00 pm (Local UK time) on Sunday, August 12th, when Perseus rises in the northeast. This is the time to look for Perseid Earthgrazers--meteors that approach from the horizon and skim the atmosphere overhead like a stone skipping the surface of a pond.

"Earthgrazers are long, slow and colorful; they are among the most beautiful of meteors," says Cooke. He cautions that an hour of watching may net only a few of these--"at most"--but seeing even one makes the long night worthwhile.

As the night unfolds, Perseus climbs higher and the meteor rate will increase many-fold. "By 2 am on Monday morning, August 13th, dozens of Perseids may be flitting across the sky every hour." The crescendo comes before dawn when rates could exceed a meteor a minute.

For maximum effect, Cooke advises, "get away from city lights." The brightest Perseids *can* be seen from towns and cities, he allows, but the greater flurry of faint, delicate meteors is visible only from the countryside.



Above: The eastern sky, viewed during the hours before sunrise on Monday, Aug. 13, 2007.

And there's a bonus: Mars. In the constellation Taurus, just below Perseus, Mars shines like a bright red star. Many of the Perseids you see on August 12th and 13th will flit right past it. Instead of following the meteor, you may find you have a hard time taking your eyes off Mars. There's something bewitching about it, maybe the red color or perhaps the fact that it doesn't twinkle like a true star. You stare at Mars and it stares right back.

Earth and Mars are converging for a close encounter in December 2007. NASA is taking advantage by launching a new mission to Mars--the Phoenix Lander. Phoenix will touch down on an arctic plain where it can dig into the ground and investigate layers of soil and ice, searching for, among other things, a habitable zone for primitive microbes. The launch window opens on August 3rd, so by the time the Perseids arrive Phoenix may be hurtling toward the Red Planet. Landing: late Spring 2008.

CaDAS will be hosting a Perseid Meteor Shower session at the Wynyard Woodland Park Planetarium and Observatory at Thorpe Thewles on Sunday 12 August, doors open at 8:00pm, why not come along.

The Effects of Gravity

By Nick Hill

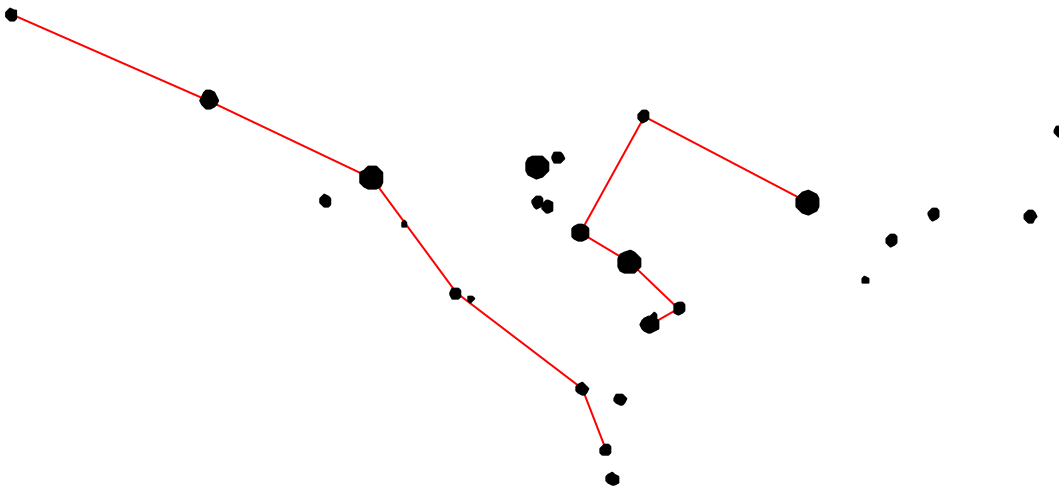
Gravity keeps things in place,
Prevents them hurtling into space,
Sir Isaac Newton's theory sound,
Prevents objects from hurtling round.
Imagine what would happen to,
The likes of me and surely you,
If gravity did not exist,
It would I know, be sadly missed.
I doubt that life on Earth would be,
Without the likes of gravity,
For all the water in the sea,
Would simply fly around you see,
And wander off into deep space,
As would all things, the human race.
In fact I doubt if you and me,
And all the fishes in the sea,
Would ever have just lived at all,
On this our Earth,
This wondrous ball.
For gravity exists in space,
Drawing particles from every place,
To form this orb, this glorious sphere,
Water and soil, the atmosphere,
And that is why we should take care,
Not to pollute the precious air.
The Moon, its gravity can't hide,
It's effect upon our sea and tide,
The rolling sea and waves so high,
All caused by the lunar's constant try,
To have his way and have some fun,
Though stopped by Earth's equilibrium.
This hidden force named gravity,
Cannot be seen by you and me,
If it was weaker we'd be taller,
Conversely stronger much, much smaller.
Proven by Astronauts in space,
Where gravity does not take place,
No pressure on bodies at all,
They grow by centimetres tall.
On Earth we cannot jump too high,
Gravity is the reason why,
All things on Earth are held in place,

By this phenomena from space.
Please do not question or indeed doubt it,
You see, we wouldn't exist without it.

(Nick has written a book - Poems from the Past "A Life of Rhyme" – a review of some funny aspects of Yorkshire and life in general, he also knows a thing or two about astronomy. Contact the Editor (Bob) for more details on book availability).

Where in the sky is this?

From Rob Pee Ling



The stars shown in this chart will be very familiar to you. However the constellation outlines I have drawn make it seem very strange. Unlike open or globular clusters, constellations are not real, physical collections of stars at all. The constellations in general are asterisms, in other words just patterns among the stars as seen through human imagination. Most of our modern constellations date back to the ancient Middle Eastern civilisations such as Babylon and ancient Egypt although the ancient Greeks heavily influence the current names and mythological connections.

There is nothing in the world stopping anyone creating their own asterisms among the stars though the innate conservatism of our culture over the millennia makes it pretty unlikely that your asterism will enter the general consciousness. Most of you will never have heard of the asterism called The Cheese. It lies in Ursa Major and it is a signpost used to locate M81 and M82 by some members of CDAS. You might think I'm being silly but the *only* thing that makes the Big Dipper more significant than The Cheese that millions of people all agree that that particular set of stars are labelled with that name whereas The Cheese is

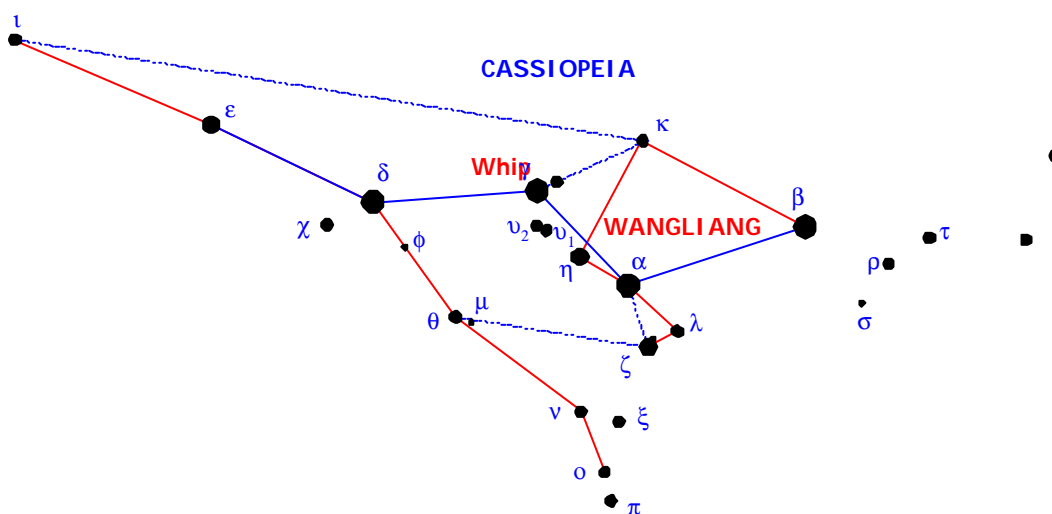
only recognised by half a dozen observers grouped outside Wynard Planetarium and Observatory.

The stars in the chart at the start of this article are all in the western constellation of Cassiopeia – if you haven't seen it yet then I'm sure you can pick out the famous 'W' shape now. The asterisms I have indicated with the lines are not mine, rather what the ancient Chinese imagined. Chinese culture developed almost entirely separately from European culture.

It shouldn't be surprising to learn that the Chinese have a completely different set of constellations to the west that connect up same stars that we see and provide different stories to explain those connections. In some cases both cultures have labelled the same stars as a constellation. Corona Borealis is an example, and is the Coiling Thong to the Chinese. In one instance coincidence has led to parallel nomenclature. In both cultures Ursa Major can be referred to as the Dipper.

Returning to Cassiopeia, the Chinese interpreted these stars as two asterisms or constellations. On the left is the Flying Corridor and to the right is Wangliang. My research has been considerably restricted by my inability to read Chinese so I can't shed an light at all on the significance of the Flying Corridor. I have found some information (although somewhat contradictory) on Wangliang.

The constellation represents the coachman of the Son of the Sky. The name Wangliang itself may be that of a historical figure, a charioteer from circa 470 BC. Wangliang himself corresponds to β Cassiopeiae. β Cassiopeiae and the surrounding it are the four horses pulling the chariot Wangliang is driving. My confusion relates to the Whip. One source refers says ? Cassiopeiae corresponds with Cexing, the Star of the Whip but two other sources identify ? Cassiopeiae as Tsih meaning the Whip.



More reminiscent of western mythological explanations is the tale of Drum at the river. Drum is equivalent to Altair and he married the Weaving Girl who was the daughter of the Celestial Emperor and is represented by Vega. The Emperor became annoyed that the couple were spending too much time together and so the girl wasn't doing enough weaving. He therefore separated them, placing them on opposite banks of the Celestial River (or Milky Way). Drum was in future only allowed to visit his wife one night a year when swans formed a bridge over the river.

Come to think of it many of the Greek myths also relate to sexual jealousy of one form or another. May be our cultures aren't so different after all.

Night moves in Mallorca

By Rod Cuff

Wearied readers may recall that I, along with Bob Mullen and Alex Menarry, have enthused here before about the distance-learning courses in astronomy that we've been taking for the past five years or so, mostly with the University of Central Lancashire. However, this academic year I enrolled on one-off courses with two other providers: Jodrell Bank and the Open University. *Exploring the Radio Universe* has good content, but has proved to be badly organised, with non-existent feedback and assignments that remain unmarked more than three months after submission. (Bob had a more positive reaction to it a couple of years back, though.)

But the short Open University course (SXR208) is something else. Called *Observing the Universe*, it's based around a residential week on the island of Mallorca, including five nights of all-night observing and data processing. John McCue was a tutor on this course a few years ago and described it from his point of view at a CaDAS meeting.

The course runs twice a year, starting in January and July; you choose your residential week from two or three options in the spring or autumn. (I chose a week near the end of April – peak bird-migration time in Mallorca! – and tacked on a couple of extra days moving around the island.) In the month or two before that week, there is a course book to work through that discusses the hardware and techniques you'll meet, and an assignment to test that you've actually read the book before you turn up in Mallorca.

You're responsible for booking your flight there and back, but your hotel and your night-time meals are included in the cost of the course. Everyone stays at the same place, a simple but clean hotel either in or within a few kilometres of Palma (this time it was one minute's stroll from the beach), and are bussed out to the Observatori Astronòmic de Mallorca, an educational observatory in the middle of

the island. Locally owned, and partly funded with EU money, it's the only such place in Europe. As well as a modest research centre, it has seven small observing domes, each containing a 30cm Meade LX200 motor-driven telescope on an equatorial pier mounting and equipped with either a 1-megapixel STL-1001E CCD camera or a specially constructed spectrograph. There's also a planetarium-cum-briefing-centre, a computer lab with an internet-connected PC for each observing team, and an informal dining room/coffee lounge.



Four of the student domes



Outside the dining room, with the research domes in the background

The core of the week is a set of predefined projects, one per team over each of the last four nights. We knew something of the projects before we went; based on our expressed preferences, we'd been divided into six teams of between 4 and 6 people per team – each team stayed together over the week, so we got to know each other's foibles (good and bad) rather well by the end. The first night (a Saturday) was just an introduction, some scene setting and a few peeks through the telescopes at Messier objects, Jupiter and Saturn (the only occasion all week on which we actually got to look through the eyepiece), and we were back to the hotel by midnight.

On subsequent evenings, though, we were picked up from the hotel at 5 pm and deposited back at around 5.45 am – exciting for the first night, exhausting by the end of the second, and business as usual after that (though my stomach never really accepted this regime, and I lost 5 lb overall). We had a full meal at 8 pm, a half-hour snack break at 1 am, and coffee whenever we felt the need. The Sunday night was devoted to getting to know how to work the dome, telescope, camera, software, coffee machine ... a time for making mistakes, of which there were many. The final four nights were all about projects, planning sessions and teamwork, with the uncomfortable knowledge that we were also being quietly assessed both as a team and as individuals by our tutor for the night. The half-dozen tutors ranged from a PhD student to very experienced professional astronomers and lecturers: being challenged by the best of them and made to

think about why certain results were turning up at 3 in the morning was wonderful, unlikely though it may seem.

The projects handled by our team were all concerned with stellar astronomy, as distinct from work on planetary science (asteroid light-curves, the mineral make-up of meteorites and choosing a suitable landing-site on Mars from surface photographs). We worked on well-documented and well-thought-out project descriptions for taking and classifying stellar spectrographs, building colour–magnitude diagrams of several star clusters, investigating how atmospheric extinction affected the determination of stellar brightness, and plotting light-curves for eclipsing binaries. As happened with some other groups, we had one absolutely disastrous night when everything went wrong (including a power cut at a crucial moment), but by the last night we were motoring. We then wanted to have a few extra nights getting right the projects that had wobbled, but noooooo ...

After a short wrap-up and feedback meeting on the Friday afternoon at the hotel, suddenly it was all over – hard to let go after such an intense week. The course wasn't finished, though; we were required to choose any one of the four projects we'd worked on, and write it up as a full scientific report over the following month, which (the hard way) made you realise how important it had been to record everything that happened during the night, all the settings of the instruments and the software, and who did what and when.



Outside the planetarium on the final evening (Rod is just to the left of middle, in the red check shirt)

The course isn't cheap – for us the fee was £615, and next year it's £660, plus the airfare. But think of it as a week's working holiday in somewhere pleasant, doing what interests you with equipment you would dearly love to own, with fellow students as motivated as you are and with excellent guidance and stimulation from professional astronomers – and then it feels much more reasonable. A great course, which everyone enthused about, and which several people wished they could do all over again next year – but you're only allowed to do it once!

Websites:

SXR208 course: www3.open.ac.uk/courses/bin/p12.dll?C01SXR208

Observatori Astronòmic de Mallorca: www.oam.es

Meade LX200 telescope: www.meade.com/lx200r

CCD camera: www.sbig.com/sbwhtmls/large_format_cameras.htm#STL-1001E

[How I started in Astronomy](#)

from Keith Johnson

Dear Editor. Further to your enquiry about how I started in astronomy ?

During the miners pit strikes in the early 1970's at around 7pm at the backend of the year all of the street light's suddenly went out, I then decided to call on my friend who lived just over the road from myself and in Pete's dark back garden I could hear voices in the distance, as my eye's slowly acclimatised themselves to the darkness I became aware that the voices were in fact Peter Rowlands and his brother Brian.

"What are you doing"? I asked,
" Come and have a look", Peter replied,

Moving closer I saw what turned out to be an 8" Charles Frank reflector, (an f8 if my mind serves me correctly) a grey plastic tube on a black cast iron mount set on top of black cast iron tripod legs with the name of Charles Frank inscribed on the base of the legs.

I'd known Peter since I was about 7yrs old and here I am aged fourteen and in all of that time never once had he mentioned that he had an interest in astronomy!

"What are you looking at" ? I asked, moving closer to this beast of a telecope Peter then pointed up to the sky -

" See that bright point of light up there to the right of those two bright stars"?

"Yes" - I replied,

"Well look into the eyepiece and tell me what you think"

"WOW" !!

"That's the planet Saturn, and those two stars to the left of it are Castor and Pollox in the constellation Gemini" - Peter replied.

From that very moment I suddenly became aware how small we were in the grand scheme of things and over the coming weeks my interest in the night sky grew and grew, we used to sit all night looking up at the night sky waiting for Skylab passing over and he would point out constellations while we were waiting,

"There it is" !! - Pete shouted, as the brilliant yellow- white star like object went over I always remember what Peter commented as we watched it passing over :

" I wish the Americans and Russians could get together and do joint venture in space ".

Such dreams were a million miles away back then - never thinking one day his wish would finally come true, over the coming weeks we used to dismantle that telescope in his bedroom cart it downstairs bit by bit and set it up in his back garden.

John and George Gargett once commented : "Once you are interested in astronomy it never leaves you, it may fade - but you never totally loose interest" It certainly is true in my case, and where is Peter now?

Well, he came over to the planetarium one night with his son and daughter when I had my telescope and Mintron camera set up, and just recently I put some photo's through his letterbox of my last visit to Patrick's for the 50yrs Sky at Night celebration party at Selsey. with a note :

"Thanks Pete, this was all down to you."

Also from Keith :-

FREE software that may be of use to members?

<http://www.stellarium.org/> free planetarium software with superb graphics.

<http://www.astronomie.be/registax/> Registax image processing software.

http://astrosurf.com/avl/UK_index.html The best free Moon atlas available

<http://astrotips.com/Downloads.phtml> A website with the widest selection of software available for all platforms.

Astronomers find most massive star ever discovered

From Phil Plait, Bad Astronomer

Astronomers using the Very Large Telescope in Chile and Hubble have discovered the most massive star ever found... and it's a bruiser, weighing in at 114 times the mass of the Sun. This blows away the previously most massive known star, which had a mere 83 solar masses. The binary star is at the center of NGC 3603

They were able to reliably determine its mass because it's in a binary system, orbiting another star (actually, they orbit each other). The orbital period is 3.77 days! By carefully observing the Doppler shift of the stars' spectra, they were able to find out not only the velocities of the stars' motions in their mutual orbit, but also other orbital parameters (the ellipticity of the orbit, its period, and so on). These in turn can give you the mass.

Usually, the tilt of the orbit messes things up. If you observe it face-on, then you get different numbers than you do if it's edge on. In other words, without knowing the tilt you can't really know the mass. However, it was found that this system is an eclipsing binary: every orbit, the stars pass directly in front or behind each other from our view. That's perfect! You can only get such a system if it is edge-on or nearly so. That constrains the tilt severely, and makes the masses easier to determine.

So in this case, we can be pretty confident of the mass of 114 times the Sun's. I'll add that the companion star is no slouch, either: it has 84 solar masses! I don't know the error bars on these masses, so I can't say for sure that even the companion star would have broken the old record. It very well might have. 114 solar masses is getting close to the limit on how massive a star can get.

More massive stars fuse elements in their core far, far more quickly than lower mass stars. That generates mind-numbing amounts of energy, making the star incredibly luminous. At some point, the star gets so massive and so bright that to a particle sitting on the surface, the force of gravity down toward the star is offset by the force of radiation pressure (literally a pressure exerted by light itself) up, away from the star. The star literally is too bright, and launches its outer surface into space. This is called *the Eddington limit*, after the astronomer who first figured it out. The actual upper limit is hard to determine, even theoretically. It can depend on many things, such as how fast the star spins, and what elements are in it — oddly enough, the presence of the element manganese lowers the mass limit because it is very effective at absorbing visible light, which tends to make it more susceptible to radiation pressure. That's the kind of incredibly detailed stuff that makes these calculations very tricky indeed.

I keep thinking about this system: a pair of 114 and 84 solar mass stars, so close together they orbit one another in less than 4 days. They must be elongated stars; the centrifugal force would be ferocious, I'd wager, and the upper layers of those stars are barely holding on due to the Eddington limit. Unfortunately, no paper was linked in the press release I received, so I can't go into too much detail without it being pure speculation. Are the stars blowing off a vast wind of material? Are they emitting gamma rays, like the scary massive binary in the cluster Westerlund 2? How long before these stars explode (and man, when they eventually explode, they'll **explode**)?

A scientific theory is much more than just a theory

(for those getting a bit twitchy about the burgeoning Creationist ideas - Editor)

You've been told that "evolution is just a theory", a guess, a hunch, and not a fact, not proven. You've been misled. Keep reading, and in less than two minutes from now you'll know that you've been misinformed. We're not going to try and change your mind about evolution. We just want to point out that "it's just a theory" is not a valid argument.

The *Theory of Evolution* is a theory, but guess what? *When scientists use the word theory, it has a different meaning to normal everyday use* That's right, it all comes down to the multiple meanings of the word *theory*. If you said to a scientist that you didn't believe in evolution because it was "just a *theory*", they'd probably be a bit puzzled.

In everyday use, *theory* means a guess or a hunch, something that maybe needs proof. *In science, a theory is not a guess, not a hunch. It's a well-substantiated, well-supported, well-documented explanation for our observations.* It ties together all the facts about something, providing an explanation that fits all the observations and can be used to make predictions. In science, *theory* is the ultimate goal, the explanation. It's as close to proven as anything in science can be.

Some people think that in science, you have a theory, and once it's proven, it becomes a law. That's not how it works. In science, we collect facts, or observations, we use *laws* to describe them, and a *theory* to explain them. You don't promote a *theory* to a *law* by proving it. A *theory* never becomes a *law*.

This bears repeating. *A theory never becomes a law. In fact, if there was a hierarchy of science, theories would be higher than laws. There is nothing higher, or better, than a theory.* Laws describe things, theories explain them. An example will help you to understand this. There's a *law* of gravity, which is the description of gravity. It basically says that if you let go of something it'll fall. It doesn't say why. Then there's the *theory* of gravity, which is an attempt to explain why. Actually, Newton's Theory of Gravity did a pretty good job, but Einstein's Theory

of Relativity does a better job of explaining it. *These explanations are called theories, and will always be theories. They can't be changed into laws, because laws are different things. Laws describe, and theories explain.*

Just because it's called a theory of gravity, doesn't mean that it's just a guess. It's been tested. All our observations are supported by it, as well as its predictions that we've tested. Also, gravity is real! You can observe it for yourself. Just because it's real doesn't mean that the explanation is a law. The explanation, in scientific terms, is called a theory.

The Theory of Evolution by Natural Selection is our best explanation for the fact of evolution. It has been tested and scrutinised for over 150 years, and is supported by all the relevant observations.

Next time someone tries to tell you that evolution is just a *theory*, as a way of dismissing it, as if it's just something someone guessed at, remember that they're using the non-scientific meaning of the word. If that person is a teacher, or minister, or some other figure of authority, they should know better. In fact, they probably do, and are trying to mislead you.

Evolution is not just a theory, it's triumphantly a theory!

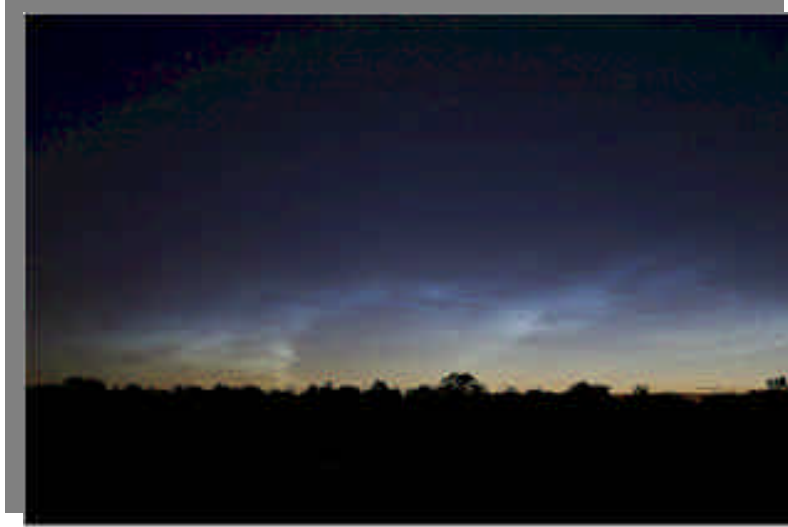
Transit Tailpieces

For Sale : Tal reflector 2M 150mm with motorised equatorial mount, 1200mm focal length, misc eyepieces and filters, with wooden boxes for telescope and motor. Offers. Contact Wynyard Planetarium 01740 630544 or e-mail b2mullen@hotmail.com (seller has lots of astro bits and pieces including Mamiya and Vivitar 35mm SLR film cameras).

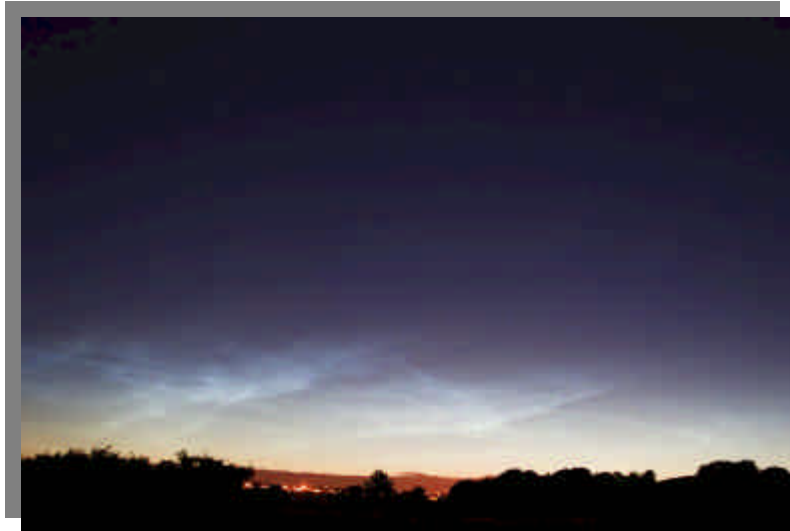
Articles : Please send contributions for the newsletter to Bob Mullen, 18 Chandlers Ridge, Nunthorpe, Middlesbrough, TS7 0JL, 01642 324939 (b2mullen@hotmail.com) Copy deadline date is the 20th of each month.

Help needed : To conduct Solar observing sessions for schools during the IHY the Planetarium needs the assistance of members who own solar telescopes or safe solar filters for use on our various telescopes. Those members lucky enough to own such equipment and willing to loan their equipment on certain solar viewing days would they please contact Ed or Bob at the Planetarium 01740 630544

The two most common things in the Universe are hydrogen and stupidity.
Harlan Ellison



Sat morning 30 June, 300D digital SLR 100 ISO 10 second exposures.
Keith Johnson



Some pictures taken early hours of Saturday morning, 30 June. John and George Gargett.