



# TRANSIT

The Newsletter of



05 November 2007



## Comet 17P Holmes - WOW !!

Using my very roughly polar aligned EQ6 Pro. mount and Jurgen's 8" f/5 Newtonian and Canon 300D @ prime focus we captured a series of images using various exposures and ISO's . The above image is a stack of 30 frames with no image manipulation whatsoever. – [Keith Johnson](#) and [Jurgen Schmoll](#)

## **Editorial**

**Last meeting** : Friday 12 October 2007

The CaDAS Planetarium Show – “Stars Downunder”, a reprise of the Southern Stars and interesting objects in the southern hemisphere, by Dr. Ed Restall, Director of Wynyard Planetarium.

An absolute tour de force by Dr Ed. He presented his show with the knowledge and skill of an astronomer who could have been based in Siding Springs, Australia for many years, although not sure if Ed has ever traveled south of the equator.

**Next meeting** : Friday, 09, November, 2007. “Extrasolar Planets and Extraterrestrial Life” by Prof. Christine Done of Durham University

### **Editorial Comment :**

#### **What you see is what you get – or is it?**

Do you remember the days before Hubble? When observing expectations were not so high, when the sight of a globular cluster in your eyepiece was just a – well – a globular cluster full of faint pale stars and a planetary nebula was just – well – a pale colourless smudge in the night sky. The excitement in those early days was the actual chase more than the capture. Do you remember wandering around Virgo and Coma Berenices, spotting faint smudge after faint smudge which, so the books told you, were other galaxies and you quite happily accepting their word.

Occasionally you would see some wonderful and very colourful images from David Malin captured from the Anglo Australian telescope down under or brightly coloured objects taken from California or Hawaii telescope of impressive size. Most amateur astronomers, although impressed by such images (or photographs as we used to call them in those days), were happy to both accept them as exceptional and expensive products of overfunded observatories would return back to the colourless smudges in their own eyepieces and exalt at the hunt.

Then came Hubble and the amateur observer’s expectations rose, why couldn’t he see the roiling red and green gases, the reflected colours on dusty pillars, the variable and differing tinges between closely adjacent stars, of course a few million dollars from the household budget might help. When I first set up a Boy Scout observing group under brilliantly clear skies I was upset to hear moans and groans from these National Geographic-reared youngsters. A pale almost colourless image in the eyepiece was their biggest disappointment – Saturn,

which has thrilled generations – looked nothing like their coloured concept of the ringed planet.

Of course with the advent of cheaper imaging technology amateurs can now produce almost professional images, the colours can finally be captured but what does this say to the newcomer? Spend lots of dosh on a big aperture, fancy pixel gatherers and computer-based mounts?

Does this make amateur astronomy any more enjoyable? I suppose it does to the techno-freaks but they will never ever experience the same excitement of crawling along the backbone and tail of Ursa Major and into Canes Venatici until M51 appears in the eyepiece, an image of varied white and grays, then carefully copied from the eyepiece into a hard back sketch pad – now that is satisfaction! Ask Michael. *Editor*

### Letters to the Editor :

A very respected local astronomer, Harry Seargeant of Guisborough, sadly passed away recently. After many years of observing Harry had collected a large collection of excellent astronomy books. Mrs Seargent has very kindly donated these pristine volumes to the Wynyard Woodland Planetarium library .

The books include the three volumes of Burnham's Celestial Handbook, Uranometria 2000.0 and the associated Deep Sky Field Guide, the SAO Star and Interstellar Object Atlas plus a number of other deeply interesting astronomy books. The books are available on loan to all from the library.

We extend our condolences to Mrs Seargent and our many thanks for her kind donation.

Harry's new Meade LX90 is advertised in Transit Tailpieces via Jack Youdale

*Bob Mullen, Editor*

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## Naked-eye Comet Holmes bursts into view

**Comet 17P/Holmes has brightened nearly a million times in the past 2 days and can be seen as a point of light with the naked eyes in Perseus.**

From Richard Talcott, October 24, 2007



above : the constellation Perseus, in the northeastern sky after darkness falls

A nearly unprecedented outburst has raised Comet 17P/Holmes from a 17th-magnitude object visible only through large telescopes into plain view without optical aid. The comet lies in Perseus the Hero and will remain visible all night from most of the Northern Hemisphere.

This morning, observers in Japan reported Comet Holmes glowing at 3rd magnitude — bright enough to see with naked eyes even from most cities — and still growing brighter. If you have clear weather tonight, head out once the sky darkens and look toward the northeast.

The comet lies about 30° high — one-third of the way from the horizon to straight overhead — at 9 p.m. local daylight time. It then appears about twice as high as the bright star Capella. For observers at mid-northern latitudes, the comet climbs directly overhead between 2 and 3 a.m. You'll have to contend with a nearly Full Moon all night, but you still should see the comet plainly.

Unlike most bright comets, Holmes doesn't possess a long tail. It looks just like a modestly bright star, so you'll need to use the finder chart to zero in on it. Even large telescopes reveal no details. The comet currently lies 150 million miles (245 million km) from Earth and 225 million miles (365 million km) from the Sun.

No one knows how long the outburst will last. When London observer Edwin J.

## Carl Sagan – Master of the Cosmos : Part 2

**Reflections on the life of one of the key popularisers of science of the twentieth century.**

from Andy Fleming

As one of the true popularisers of astronomy and science, Sagan relished the opportunity. The result was an inspiring, lavish and totally exquisite thirteen-part series, first broadcast in 1980 and viewed (according to the NASA Office of Space Science) by over 600 million people in over 60 countries worldwide – still the most-watched science documentary series ever. It thus comes as little surprise that the series was immediately awarded an Emmy and Peabody Award. As Druyan notes it is a fitting tribute to the foresight of her late husband, that even the recent digital remastering of the entire series required little updating regarding factual content.

The power of *Cosmos* lies in Sagan's inspirational delivery of its main contention – our oneness with the Cosmos. To view *Cosmos* is one of the most spiritually uplifting experiences, made all the more remarkable because it is a science series. For example, it explains how we, and all the creatures with which we share the Earth are all made of *star stuff*, from the elements in our own bodies including the calcium in our bones, the iron in our blood, to the carbon in each and every cell. Whilst the first light elements such as hydrogen and helium were formed at the time of the Big Bang nucleosynthesis, the heavier elements, such as nickel, copper, iron and oxygen were synthesised in the nuclear furnaces of long-dead stars, many of which became *supernovae*. The heavy chemical elements, were a product, once this first generation of stars had used all of their hydrogen nuclear fuel.

Sagan movingly sums up the whole process in the introduction to both the series and the book that in effect, *the Cosmos, is all that is, all that has been, and all that ever will be*. Through a process of nearly fourteen billion years of cosmic evolution, and later Darwinian Natural Selection, humans evolved and became a very special part of this cosmos. In effect, through mankind, the cosmos has evolved its very own intelligence and consciousness – star stuff harvesting star light and enquiring about its own existence.

In taking complex scientific theories and concepts such as Special Relativity, Darwinian Selection and Atomic Theory and presenting them in a correct, yet readily understandable form, without the need for complex mathematics, Sagan realised the importance for mankind's future wellbeing of the public's understanding of science and involvement in what both he and Druyan termed the *Scientific Enterprise*. Despite making scientific knowledge easily accessible

to a the general public he received many criticisms from the scientific elite, many no doubt jealous of his deserved celebrity status, or annoyed at his attacks on vested interests. His explanation in *Cosmos* of Special Relativity, “*Journeys in Space and Time*”, remains one of the most eloquent and understandable introductions to the subject, enticing the reader or viewer to delve deeper.

The issue of scientific advocacy repeatedly appears throughout Sagan’s many books including *Pale Blue Dot: A Vision of the Human Future in Space* and *The Daemon Haunted World: Science as a Candle in the Dark*. He uses the example of the destruction of Ptolemy II’s Great Royal Library in Alexandria in 415AD, and the murder of Hypatia, its last librarian and the world’s first female mathematician by the mob, as an example of what can happen when knowledge is kept secret by a ruling elite.

The result of the destruction of the Great Library, and the Ionian civilisation centuries before was the loss of knowledge of incalculable value amassed over a thousand years, and the start of a dark epoch in human history. This epoch was characterised by mysticism, bigotry, racial and religious extremism and hatred and witchcraft, ending only with Copernicus, Johannes Kepller, Tyco Brahe and Galileo Galilei and Giordano Bruno (many of whom even in the seventeenth century were being persecuted by the Roman Catholic Church, and indeed in the case of Bruno murdered for the heretic act of speculating about a galaxy brimming with exo-planets and extraterrestrials).

Neither has the threat to our present civilisation from ignorance evaporated. In *Pale Blue Dot*, Sagan notes how we (in western civilisation) have contrived to produce advanced societies based primarily on high technology and science where only a small fraction of the population has any scientific knowledge. This, according to Sagan, coupled with the growth in religious extremism, racial hatred, superstition, the supernatural and pseudoscience is a recipe for disaster, and one, given our advanced weaponry will sooner, or later, explode in our faces.

Sagan appeals to scientists and science enthusiasts alike to become advocates for the subject. Instrumental in both the Viking landings on Mars in the summer of 1976 and the Voyager missions to the outer planets in the 1980s, he uses the Voyager 1 “Pale Blue Dot” photograph of the Earth as an example (*please see CaDaS Transit, April, 2007, page 14 for full details*). Senior administrators at NASA did not want to waste resources re-configuring the spacecraft to take a photograph of the Earth from six billion kilometres. Sagan appealed above their heads citing the immense public interest of the photograph. After all, he stated the US public was funding NASA and as paymasters they had a right to witness what would become one of the most famous photographs of all time – the Earth as a pale blue mote of dust suspended in a sunbeam.

It is by no means certain that humanity will avoid self-destruction either through environmental degradation or through weapons of mass destruction (and there

are more than adequate quantities still available). In both *Cosmos* and *Pale Blue Dot*, Sagan speculates that simultaneously to gaining interstellar communications ability, civilisations also gain atomic physics, and perhaps more-or-less immediately use nuclear weapons to engage in self destruction. Perhaps this is why we have not been visited by ET. Or, as Sagan says, perhaps ET is constantly dealing with its self-generated environmental degradation.

But above all else, Sagan, in all his science advocacy is an optimist and believes that humanity can and will rise above the challenges posed by our very nature, the juxtaposition of our technology with beliefs, and the disasters that nature can throw at the Earth, such as asteroid impacts. It will be achieved, he says, by the same scientific enterprise with its proven successful method of critically independently verified facts and theories, not by superstitions, ufology or mysticism.

Scientists have made astonishing leaps forward in the past 400 years, for example in technology and medical sciences – infact in virtually every area of modern advanced industrial society. Compare that, Sagan says, with what other areas of human thought and belief have provided in improving the lives of the populace. Instead of wanting to believe in something amazing – do something amazing. Add to the body of human knowledge about the cosmos, or show a child the Andromeda Galaxy. Show them how the light, the fastest thing we know has taken a staggering 2.5 million years to reach our eyes! Inspire them to naturally develop that innate human curiosity about science and the universe in which we live.

Sagan powerfully states in *Cosmos* that it is the birth rite of every child, of every generation to gain knowledge about their place in the universe, and to critically evaluate such knowledge and facts. To do less would risk being taken in by the first charlatan character, perhaps even on a societal scale – and there are plenty of examples of that in human history. Extraordinary claims do indeed require extraordinary evidence. As Sagan says, there are no authorities in science, it's a totally democratic subject, relying on verified facts, and theories that are readily falsifiable. Yet it's also a very human and creative subject. No one knows from which ranks the next Einstein, or Newton will come.

No article on Carl Sagan would be complete without mentioning *Contact*. The book, upon which the movie that followed it is largely based, was written by Carl Sagan and published in 1985. Some of Sagan's character traits are evident in the main character, *Ellie Arroway*, and the novel serves as an enthralling platform in which he encapsulates ideas surrounding many of his life's interests, especially the first contact with extraterrestrials. A film adaptation of *Contact*, starring Jodie Foster, was released in 1997. Without spoiling the film, for those yet to view it, *Dr. Ellie Arroway* (Jodie Foster), after years of searching for "the truth" in radio astronomy, finds conclusive radio astronomical proof of intelligent aliens, who have been receiving our first radio and television broadcasts since the early



twentieth century. The aliens send plans of how the human race can construct a machine of immense technology using *wormholes* (the scientific theory behind this was confirmed as correct by Sagan's fellow scientist and colleague, Kip Thorne). Ellie's role in the movie is juxtaposed with that of *Palmer Joss* (Matthew McConaughey). He has spent his life searching for "*the truth*" through faith in God. This first radio "*contact*", means that both Ellie and Palmer, and indeed, everyone on Earth, are forced to challenge their own assumptions. In the inevitable first contact, will humankind be able to find a compromise between science and belief? If any movie is worth watching – this is it!

Tragically, Sagan died in December, 1996, after a long fight with myelodysplasia, a rare form of bone cancer at the comparatively young age of 62. A voice of reason and science in a world where superstition and mysticism are once again in the ascendancy, he was one of those talented individuals humanity, at a critical juncture in its history, could least afford to lose. The challenge is for his readers, viewers and students to pick up the gauntlet.

If you ever endeavour to rationalise why you are so avidly interested in astronomy and cosmology, re-visit Carl Sagan's vast astronomical bequest to the public. He succinctly explains why we tingle at the thought of the cosmos and long to leave the Earth – it's in our genes to return to the stars. More importantly you realise the immense importance of science, and of inspiring your children, or the young generation generally with the subject. Yet you are probably depressed at the degradation and sensationalisation of science documentaries on television.

If this is the case, and you get the chance, buy the *Cosmos* DVD set, or buy the book or any of Sagan's other publications. All of his books are readily available from public libraries. Allow this potent master of the Cosmos into your homes and let him inspire your families, friends and importantly youngsters in taking an interest in science.

The proof of Sagan's potent teaching and inspiration lies in many of his students and colleagues who have gained leading roles in space exploration. These include Carolyn Porco, a leading US planetary scientist, Director of the Hayden Planetarium, New York and PBS-Nova presenter Neil deGrasse Tyson, and Steve Squyres, principal investigator of the NASA Mars Exploration Rovers, Spirit and Opportunity.

On a personal level, had it not been for a chance viewing of the PBS *Cosmos* series a year ago, you would not be reading this now, and neither would you see myself or my son, David thoroughly relishing our visits to the Wynyard Planetarium!

**Recommended Reading:**

*Communication with Extraterrestrial Intelligence* (MIT Press, 1973)  
*Mars and the Mind of Man* (Harper & Row, 1973)

*Broca's Brain: Reflections on the Romance of Science* (Ballantine Books, 1974)  
*Other Worlds* (Bantam Books, 1975)

*Murmurs of Earth: The Voyager Interstellar Record* (Random House, 1977)

*The Dragons of Eden: Speculations on the Evolution of Human Intelligence*  
(Ballantine Books, 1980)

Ann Druyan, co-author, *Shadows of Forgotten Ancestors: A Search for Who We Are* (Ballantine Books, 1993)

*Pale Blue Dot: A Vision of the Human Future in Space*. Random House,  
(November 1994)

*The Demon-Haunted World: Science as a Candle in the Dark* (Ballantine Books,  
1996)

Ann Druyan co-author, *Billions and Billions: Thoughts on Life and Death at the  
Brink of the Millennium* (Ballantine Books, 1997)

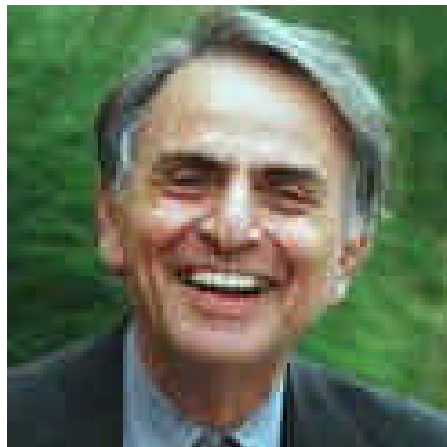
*The Varieties of Scientific Experience: A Personal View of the Search for God*,  
1985 (Gifford lectures, Penguin Press, 2006).

**Recommended DVD set:**

*Cosmos: A Personal Voyage* by Carl Sagan. The complete digitally remastered  
landmark PBS TV series including updates and some new graphics. Available  
from amazon.com, or contact Cosmos Studios via [www.carlsagan.com](http://www.carlsagan.com)

**Recommended Website:**

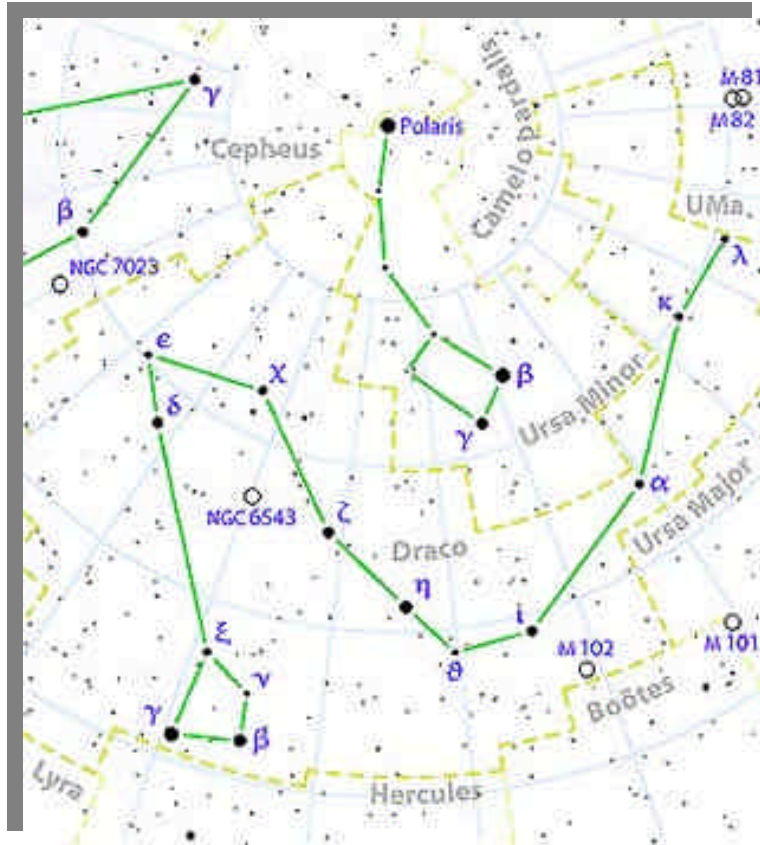
[www.carlsagan.com](http://www.carlsagan.com) – the Carl Sagan Portal in association with Cosmos Studios.  
Share your thoughts about Carl Sagan by subscribing to his widow, Ann  
Druyan's blog.



**Carl Sagan** 1934-1996

## See the Celestial Dragon

By Joe Rao



Have you ever wondered why a particular group of stars was made into a certain constellation? Sometimes a star pattern suggests an object, creature or person. Other constellations portray mythological creatures such as unreal monsters.

Draco, the Dragon, is one of these.

Draco is almost entirely circumpolar – that is, it always remains above the horizon, never rising or setting for skywatchers at most mid-northern latitudes. But right now is the best evening season for tracing out the windings of this unusual beast's snakelike body. This week, between 8:30 and 9:00 p.m. local daylight time, he appears to pass between both the Little and Big Dippers, with his head raised high above Polaris, almost to the overhead point (called the zenith).

The Dragon's head is the most conspicuous part of Draco: an irregular, albeit conspicuous quadrangle, not quite half the size of the Big Dipper's bowl. You can

find it situated about a dozen degrees to the north and west of the brilliant blue-white star, Vega, the brightest of the three stars that make up the Summer Triangle (ten degrees is roughly equal to your clenched fist held at arm's length).

Draco is a very ancient grouping. The earliest Sumerians considered these stars to represent the dragon Tiamat. Later it became one of the creatures that Hercules killed. One of Draco's tasks was to guard the garden of Hesperides and its golden apples that Hercules was supposed to retrieve. In the stars, as Draco coils around Polaris we now see Hercules standing (albeit upside down) on Draco's head.

The brightest star is Eltanin, a second magnitude star, shining with an orange tinge. This star is famous for being the one with which the English astronomer, James Bradley, discovered the aberration of starlight – an astronomical phenomenon which produces an apparent motion of celestial objects - in the year 1728. Interestingly, a number of temples in Ancient Egypt were apparently oriented toward this star.

The faintest of the four stars in the quadrangle is Nu Draconis, a wonderful double star for very small telescopes. The two stars are practically the same brightness, both appearing just a trifle brighter than fifth magnitude and separated by just over one arc minute (or about 1/30 the apparent diameter of a full Moon). I first stumbled across Nu as a teenager in the Bronx, using low power on a four-and-a-quarter-inch Newtonian reflecting telescope. I likened it to a pair of tiny headlights. Check it out for yourself.

The pole of the heavens is moving slowly among the constellations of the northern sky, once around a large circle. It is owing to a movement of the Earth for which the pull of both the Sun and Moon on our bulging equator is chiefly responsible, a movement known as "precession." This double attraction causes the Earth to wobble slightly like a slowing-down top does.

While the tilt of the axis to the Earth's orbit remains the same (tilted 23.5 degrees from the equator), the axis itself describes a funnel-shaped motion, completing one rotation in about 25,800 years. This time span – one complete wobble – is called a "Great" or "Platonic" Year.

Located in Draco's tail is the faint star Thuban. During the third millennium, BC, the Earth's axis was pointed almost directly at this star. As such, Thuban was the North Star when the Pyramids were being built, some 5,000 years ago. Thuban was nearest to the North Pole of the sky about 2830 B.C. It then shone in the sky almost motionless in the north near to where the current North Star, Polaris, now appears. Look roughly midway between the bowl of the Little Dipper and the star Mizar (where the Big Dipper's handle bends) and there you will find the former North Star.

And thanks to the oscillating motion of precession, Thuban will again be the North Star some 20,000 years from now.

## An Astronaut in Yorkshire

from Neil Haggath

Two years ago, I had the great honour and privilege of meeting one of the astronauts who walked on the Moon – namely Charlie Duke, Lunar Module Pilot of Apollo 16.

On 11 October this year, I had the equal honour and privilege of meeting another – namely Alan Bean of Apollo 12, now aged 75.

Both events took place in Pontefract; they were organised by Ken Willoughby of West Yorkshire Astronomical Society, in association with a local school, and paid for by sponsorship from local businesses, as well as the modest admission fees.

Alan actually gave two talks – one for local schools during the day, then a public one in the evening. Between the two, he spoke to around 1000 people. Those who wished got to meet him after the talk, as he signed autographs and posed for photos.

Commander Alan L. Bean, USN, as he then was, went to the Moon in November 1969, as Lunar Module Pilot of Apollo 12, the second landing mission. The mission commander, the late Charles “Pete” Conrad, and Command Module Pilot Dick Gordon were both veterans of Gemini flights, but it was Alan’s first spaceflight. In fact, Alan had not originally been chosen for the crew; the intended LMP, C. C. Williams, was killed in an aircraft crash during training, and Conrad personally chose Alan as his replacement.



[above](#) : Apollo 12 crew portrait. ( l. to r. ) Pete Conrad, Dick Gordon, Alan Bean

After Apollo 11 had proved that a crew could safely land on the Moon and return to Earth, Apollo 12 had more ambitious objectives. Conrad and Bean spent 31 hours on the Moon and performed two EVAs. They had made a pinpoint landing, within less than a kilometre of the unmanned Surveyor 3 probe, which had

landed in 1967. During their second EVA, they visited Surveyor 3, and removed a camera and other parts from it, which were brought back to Earth for analysis, to see how materials were affected by prolonged exposure to space.

For the first time, colour TV pictures were transmitted from the Moon ( Apollo 11 had sent only black and white ) – but sadly, not for long. Early in the first EVA, Alan accidentally damaged the TV camera by pointing it too close to the Sun, so the viewers on Earth had to settle for sound only! Alan was honest enough to admit, during his talk, that it was his fault.

Four years later, Alan – then a Navy Captain - made his second and last spaceflight. He commanded the second crew of the Skylab space station ( his former crewmate, Pete Conrad, had commanded the first ), which spent 59 days in space – a record at the time.

After retiring from the Astronaut Corps and the Navy, Alan became an artist; to this day, he continues to paint pictures based on his own experiences in space, and those of his fellow astronauts.

Alan's talk was delivered in a chatty and humorous style. He told us about how, as a Navy pilot, he came to be selected as an astronaut, and then described the Apollo 12 mission in some detail. For example, he told the well-known story of how the mission almost had to be aborted during launch; it was launched during a thunderstorm, and 55 seconds after lift-off, the spacecraft was struck by lightning! This caused a number of circuit breakers to trip, and in the Command Module, the crew were faced with a bewildering combination of warning lights. The mission was saved by the quick thinking of one of the flight controllers at Houston, who instructed the crew to switch to an auxiliary power supply.

The latter part of the talk was devoted to Alan's art, and illustrated with some of his paintings.

Like Charlie Duke before him, he corrected a popular misconception. Some people seem to think that the pioneering astronauts were paid huge sums of money for doing such a dangerous job – they were not! In those days, most of the astronauts (with a handful of exceptions, notably Neil Armstrong) were serving military officers, on secondment to NASA; they were paid nothing more than their standard military salaries, according to their rank. Alan said that he never cared what he was paid; he was privileged to be part of it, and would have flown on the mission for nothing!

The most amusing part of the evening was the questions session. Someone brought up the old favourite subject of “personal hygiene” aboard the cramped Apollo spacecraft; in response, Alan treated us to a quite graphic description of how unmentionable bodily functions had to be carried out, which had the audience laughing and cringing in equal proportions!

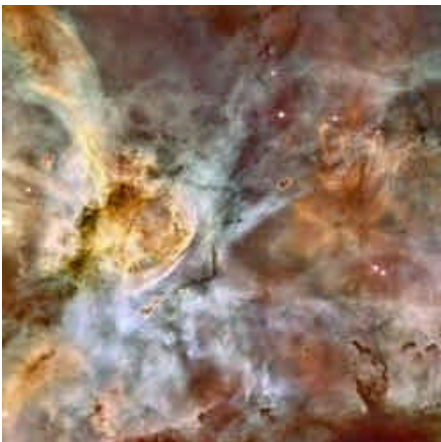


left : Here's Yours Truly meeting Alan

**Once again, it was a thoroughly enjoyable evening. Ken Willoughby, who did an excellent job of organising it, hopes to repeat the experience with a couple more of the Apollo astronauts over the next couple of years, while most of them are still with us.**

## **True or False (colour). The Art of Extraterrestrial Photography**

Written by Nancy Atkinson



*Left : The Carina Nebula*

When you look at the amazing pictures captured by Hubble, or the Mars Exploration Rovers, do you ever wonder: is that what you'd really see with your own eyes? The answer, sadly, is probably not. In some cases, such as with the Mars rovers, scientists try and calibrate the rovers to see in "true colour", but mostly, colours are chosen to yield the most science. Here's how scientists calibrate their amazing instruments, and the difference between true and false colours.

Question: True or false: When we see the gorgeous, iconic images from the Hubble Space Telescope or the stunning panoramas from the Mars Exploration Rovers, those pictures represent what human eyes would see if they observed those vistas first hand.

Answer: For the Hubble, mostly false. For the rovers, mostly true, as the rovers provide a combination of so-called "true" and "false" colour images. But, it turns out, the term "true colour" is a bit controversial, and many involved in the field of extraterrestrial imaging are not very fond of it.



"We actually try to avoid the term 'true colour' because nobody really knows precisely what the 'truth' is on Mars," said Jim Bell, the lead scientist for the Pancam colour imaging system on the Mars Exploration Rovers (MER). In fact, Bell pointed out, on Mars, as well as Earth, colour changes all the time: whether it's cloudy or clear, the sun is high or low, or if there are variations in how much dust is in the atmosphere. "Colours change from moment to moment. It's a dynamic thing. We try not to draw the line that hard by saying 'this is the truth!'"

Bell likes to use the term "approximate true colour" because the MER panoramic camera images are estimates of what humans would see if they were on Mars. Other colleagues, Bell said, use "natural colour."  
Zolt Levay of the Space Telescope Science Institute produces images from the Hubble Space Telescope. For the prepared Hubble images, Levay prefers the term "representative colour."

"The colors in Hubble images are neither 'true' colours nor 'false' colours, but usually are representative of the physical processes underlying the subjects of the images," he said. "They are a way to represent in a single image as much information as possible that's available in the data."

True colour would be an attempt to reproduce visually accurate color. False colour, on the other hand, is an arbitrary selection of colours to represent some characteristic in the image, such as chemical composition, velocity, or distance. Additionally, by definition, any infrared or ultraviolet image would need to be represented with "false colour" since those wavelengths are invisible to humans.

The cameras on Hubble and MER do not take colour pictures, however. Colour images from both spacecraft are assembled from separate black & white images taken through colour filters. For one image, the spacecraft have to take three pictures, usually through a red, a green, and a blue filter and then each of those photos gets downlinked to Earth.

They are then combined with software into a colour image. This happens automatically inside off-the-shelf colour cameras that we use here on Earth. But the MER Pancams have 8 different colour filters while Hubble has almost 40, ranging from ultraviolet ("bluer" than our eyes can see,) through the visible spectrum, to infrared ("redder" than what is visible to humans.)



left : The same rock imaged in true and false color by Opportunity.



This gives the imaging teams infinitely more flexibility and sometimes, artistic license. Depending on which filters are used, the colour can be closer or farther from "reality." In the case of the Hubble, Levay explained, the images are further adjusted to boost contrast and tweak colours and brightness to emphasize certain features of the image or to make a more pleasing picture.

But when the MER Pancam team wants to produce an image that shows what a human standing on Mars would see, how do they get the right colours? The rovers both have a tool on board known as the MarsDial which has been used as an educational project about sundials. "But its real job is a calibration target," said Bell. "It has grayscale rings on it with colour chips in the corners. We measured them very accurately and took pictures of them before launch and so we know what the colours and different shades of grey are."

One of the first pictures taken by the rovers was of the MarsDial. "We take a picture of the MarsDial and calibrate it and process it through our software," said Bell. "If it comes out looking like we know it should, then we have great confidence in our ability to point the camera somewhere else, take a picture, do the same process and that those colours will be right, too."

Hubble can also produce colour-calibrated images. Its "UniverseDial" would be standard stars and lamps within the cameras whose brightness and color are known very accurately. However, Hubble's mission is not to produce images that faithfully reproduce colors. "For one thing that is somewhat meaningless in the case of most of the images," said Levay, "since we generally couldn't see these objects anyway because they are so faint, and our eyes react differently to colours of very faint light." But the most important goal of Hubble is produce images that convey as much scientific information as possible.

The rover Pancams do this as well. "It turns out there is a whole variety of iron-bearing minerals that have different colour response at infrared wavelengths that the camera is sensitive to," said Bell, "so we can make very garish, kind of Andy Warhol-like false color pictures." Bell added that these images serve double duty in that they provide scientific information, plus the public really enjoys the images.

And so, in both Hubble and MER, colour is used as a tool, to either enhance an object's detail or to visualize what otherwise could not be seen by the human eye. Without false colour, our eyes would never see (and we would never know) what ionized gases make up a nebula, for example, or what iron-bearing minerals lie on the surface of Mars.

As for "true colour," there's a large academic and scholarly community that studies colour in areas such as the paint industry that sometimes gets upset when the term "true colour" is used by the astronomical imaging group. "They have a well-established framework for what is true colour, and how they quantify

colour. But we're not really working within that framework at that level. So we try to steer away from using the term 'true colour'."

Levay noted that no colour reproduction can be 100% accurate because of differences in technology between film and digital photography, printing techniques, or even different settings on a computer screen. Additionally, there are variations in how different people perceive colour.

Bell concluded, "What we're doing on Mars is really just an estimate, it's our best guess using our knowledge of the cameras with the calibration target. But whether it is absolutely 100% true, I think it's going to take people going there to find that out."

## [My Search for Planet Pluto](#)

from Michael Roe

For many years I have really wanted to see Pluto, the 9<sup>th</sup> Planet, as I have seen all the other Planets.

Of course we all know about the International Astronomical Union's classification demoting Pluto from a planet to a dwarf planet. Well, its always been called a planet since its discovery in 1930 and that is what Pluto will always be to me, that's my classification! And the astronomers who voted for that ridiculous decision? - I have reclassified them as astrologers!

Now back to my search. In 1981 I bought a Celestron 8" Schmidt Cassegrain telescope. This size of telescope can see Pluto but only on a high mountain with dark skies far away from any light pollution. My family home in Brotton has a large back garden just didn't have a dark enough sky. I did try in 1982 but I couldn't see Pluto.

You must remember Pluto is exceedingly difficult to see, locating it isn't easy either. The British Astronomical Association (I'm a member) used to have a good chart in the handbook, unfortunately now the finder chart only goes to +12 magnitude., Pluto is +14 magnitude. There is a very detailed chart for June, this is the opposition month for Pluto but finding anything faint in June at a latitude of 54 degrees north is impossible.

What I really needed was a larger telescope. A Schmidt Cassegrain like my 8" Celestron of a larger size would be too heavy to move and incredibly expensive. A better idea would be a Dobsonian telescope, really a Newtonian reflector on a simple azimuth mounting. In 2006 I started looking seriously for such a telescope, 12" aperture would be large enough.

I finally found such a telescope, a Meade Lightbridge 12" Dobsonian. I would have preferred another telescope, the Revelation II, but the Lightbridge seem to be the only 12" Dobsonian available at the time (*Meade had pressured their UK suppliers into withdrawing the Revelation II from sale and only offering the Lightbridge – unfair pressure?, Ed*). I purchased it for the sum of £688.98p.

A few days later my brother Adrian and I assembled the telescope from its two large boxes, it took less than an hour. Now it was time for testing. The one disadvantage of the Lightbridge telescope is the lack of a decent spotter scope, essential to find faint objects. Instead the telescope has a red-dot finder which is fine for bright objects but that's all it can really find.

On 2<sup>nd</sup> December 2006, I observed the nearly full Moon and drew it by hand with a x 59 eyepiece. Meanwhile I needed a really good finder chart to precisely locate Pluto, one with stars down to +15. Luckily I was able to use a Palomar Sky Survey from the Planetarium print to draw my own chart of Pluto's position for Spring 2006, with stars to magnitude +15.

So, I had a huge telescope with only approximate pointing abilities, the red-dot finder, but I temporarily solved this problem by wiring my small binoculars to the Lightbridge tube and, using bright stars, lined the binoculars up to the telescope.

Now I could use my new telescope to its full potential. On 6<sup>th</sup> December 2006 I began with M31, the Andromeda galaxy, and then on the 9<sup>th</sup> December I observed the Pole Star, easily seeing its tiny companion. I had three eyepieces; 26mm at x 59, 15mm at x 102, and 9.7mm at x 157: The views were wonderful, very wide fields of view at x 59. I observed the Moon at x 157, doing drawings of my observations.

I then observed the faint NGC2158 star cluster next to the M35 cluster in Gemini. More galaxies followed, the M81 and M82 pair in Ursa Major and M101 and M51 spiral galaxies, all better seen than through my 8" Celestron. I saw very faint galaxies too, one near the star 70 Ursa Majoris, others in the bowl of the Plough. By 20<sup>th</sup> December I could see the faint spiral arms in the M51 galaxy. On 20<sup>th</sup> December I saw my first planet, Saturn and on 30<sup>th</sup> January and 7<sup>th</sup> February I saw Venus and Mercury but in other 8" Celestron telescope.

Using my new telescope now fitted with a proper 6x30 finderscope, I observed the M42 Orion Nebula and more galaxies. The M13 in Hercules is really spectacular, more faint stars than I could draw. All this is what I dreamed of of seeing in over 40 years in astronomy!

By late April it was time to search for Pluto. Cloudy weather delayed this but on 9<sup>th</sup> May I tried, observing the field of stars but failing to see Pluto. Again and again I tried pushing my telescope and my eyes to the limit at x 157. On 18<sup>th</sup> May

I saw a very slow satellite in Pluto's field of view moving 2' per minute near 0.50hrs GMT.

Then on 29<sup>th</sup> May 2007 I used the Celestron x 169 eyepiece on my Lightbridge. Did I see Pluto? I like to think I saw Pluto, my 9<sup>th</sup> planet that night.

Leter I saw Venus and Mercury with my Lightbridge telescope, very bright lights near my backyard have ruined any more observing, though I hope to see the other planets. I have observed Jupiter so that leaves, Mars, Uranus and Neptune. I would love to confirm my sighting of Pluto next year if I could get my Lightbridge telescope on a flat part of the Yorkshire Moors, perhaps I could!.

### Amateur?

The word "amateur" is highly contentious among astronomers. Technically it means someone who is not paid for the work they do, but it has connotations of meaning "not well done" and "poorly thought-out".

When it comes to astronomy, that's just plain silly. Amateurs may not get paid to do astronomy, but in many cases they are every bit the equal of professional astronomers. And sometimes they eke out a lead, too.

Such is the case of Arto Oksanen, a Finnish amateur.

On October 10 of 2007, using a 40 centimeter (14") telescope, he found the optical afterglow for a gamma-ray burst, a titanicly powerful explosion created when a massive star explodes and forms a black hole. GRBs produce light across the electromagnetic spectrum, but they fade to invisibility incredibly quickly, usually within minutes or even seconds. This makes observing the afterglow very tricky.



Recent advances have made it easier: telescopes in space (like Swift) detect the GRBs and send down the coordinates of the burst within literally seconds of the discovery. If you have an automated telescope, and subscribe to the email alerts, you can chase down the afterglows. But you have to be fast!

Oksanen was fast. He found the fading optical blast from GRB 071010B, the second GRB detected on October 10, 2007 (hence the GRB designation) just 17 minutes after the burst began, when it was at an optical magnitude of 17.5 (about 1/40,000th as bright as the faintest star you can see with the unaided eye). This quick work beat out the professional astronomy community, and provided critical observations of the early time activity of the burst, which provides key insight into the physics of the explosion.

**Follow-up observation of the burst by the massive Gemini and Keck telescopes indicated it was at a distance of 7 billion light years away. That's a pretty fair distance to be seen by a 14" 'scope. While I'm sure Oksanen's setup is pretty sophisticated, in fact that kind of telescope is not too expensive as things go.**

## [Asteroid 1999 AN10 – a Potentially Hazardous Object?](#)

From Universetoday.com

New observations are now available for asteroid 1999 AN10, which is gradually moving away from the glare of the Sun. The new data allow a considerably improved orbit to be calculated for this potentially hazardous object, and the revised predictions indicate that this kilometer-size asteroid could pass particularly close to the Earth on August 7, 2027.

The passage in 2027 could be as close as 37,000 km from the Earth's center (just 19,000 miles above the Earth's surface), **but no closer**. The miss distance is still very uncertain, and the asteroid could easily pass well outside the Moon's orbit. The probability of a collision in 2027 is essentially zero.

There is still a very remote possibility that asteroid 1999 AN10 could pass by Earth in 2027 in such a way as to return in the year 2039 on an impacting trajectory. First identified by researchers Andrea Milani, Steven R. Chesley and Giovanni B. Valsecchi, this scenario is still exceedingly unlikely, but the probability of collision in 2039 has now increased to about 1 chance in 10 million.

1 chance in 10 million is way low... the asteroid Apophis has a 1 in 45,000 chance of hitting us in 2036, so really, that's a far, far better bet. And it passes us in 2029, so it too passes us twice.

## THE ABYSS OF TIME

from Mike Gregory



Hutton's Unconformity at Siccar Point, Berwickshire, in 1988

One bright and breezy high summer day in 1788 a small schooner sailed south along the Berwickshire coast of eastern Scotland. On board were three passengers, all gentlemen of private means, and they made landfall at a place called Siccar Point. These three passengers were James Hutton (1726-97); his then not so young protégé, John Playfair (1748-1819); and the Scottish baronet, Sir James Hall (1761-1832). Many years later John Playfair, a professor of mathematics, was to recall this day vividly. In an address to the Royal Society of Edinburgh in 1805 he said, "The mind seemed to grow giddy by looking so far back into the abyss of time." So what did John Playfair and his companions see that day which so moved him to quote the above words?

James Hutton was born and educated in Edinburgh and later continued his medical studies at Paris and Leiden. Although he qualified as a doctor of medicine, he never followed his training, being more interested in the circulatory system of planet Earth rather than the circulatory system of the human body.

James has been called the 'father' of (relatively) modern geology and it was he who coined the phrase 'geological cycle', which means the geological history of our planet is one continuous cycle. This went very much against the thoughts of his time, science then still being controlled very much by theologians and philosophers. Over on the continent the charismatic German mineralogist, Abraham Werner, contended that most rocks were sediments deposited by the last biblical flood and would probably stay that way until the next divine catastrophe. His explanation of volcanism was that it was caused by coal seams self-igniting well below ground! Hutton, however, could not accept that the Earth was less than 6,000 years old, as had been decreed by the Anglo-Irish prelate, Bishop James Ussher's calculations of the previous century. Hutton preferred to

consult 'God's books' – the rocks themselves, rather than to delve into some obscure corner of the bible for an insight into the history of planet Earth.

According to John Playfair, Hutton had dragged him into every hole, nook and cranny around the Lothians. They had stood knee deep in cold streams and wandered over the Southern Uplands all in pursuit of geological understanding. And it was one such day that brought them and Sir James Hall to Siccar Point. Hutton had visited here many times by himself and he felt that the carcass of the earth was laid bare here. He wished to show his friends what he had found.

More recently known as Hutton's Unconformity, the formation reveals a hidden chapter in what Hutton termed the 'annals of the Earth'. We know today that the almost vertical beds of grey slate were originally washed down from a long gone mountain chain as silt and mudstone sediments into a shallow-sea environment. Packed layer upon layer over several million years, movement deep beneath the earth folded this material imperceptibly at less than one mm per year. Nevertheless, over thousands of square kilometres, pressure, heat and time, known as low-grade metamorphism, converted and folded the compressed layers of shale and mudstone into the almost vertical beds of grey slate we see today. Over countless eons of time erosion finally exposed these beds, whereupon the Old Red Sandstone has been laid unconformably atop the slate. As red sandstone is usually the product of an arid, desert environment, this must have taken millions of years. Modern radiometric dating suggests 80 million years between the laying down of the shale and mudstones and then the sandstone being laid out of sequence on the top. However, this is not the end of the process for as the photo shows, the once level sandstone now dips slightly to the northeast. Obviously something else, long since eroded, was deposited unconformably on the sandstone.

This is what John Playfair saw on that day in 1788. It was obvious to the three companions that the geological formations they had seen could not possibly be the product of six thousand years, but as Hutton died 99 years before the discovery of radio activity, they could only take a calculated guess. Hundreds of thousands of years perhaps! By 1900 the age of the Earth was 2000 MY and by 1939 more than double that figure.

Unfortunately, despite his great skill in the field, Hutton was not very successful in putting his findings down on paper. Hence it was left to John Playfair to publish Hutton's work some years after Hutton had died. Later, Sir James Hall, often thought of as the founder of experimental geology, was able to provide proof of several of Hutton's theories by his experiments in the laboratory as well as in the field.

And so, some two hundred years and a few months after Hutton and his friends visited Siccar Point, so did I. Would I recognise Hutton's Unconformity? I asked locally at an industrial estate situated in a worked out quarry, and no one had

heard of it. Nevertheless, a short walk across some fields soon brought me to the site. It was unmistakable, a brief history of the Earth all laid out before me!

## Charles Messier

from David Fleming

What sort of person doesn't want to see Messier's 103 beautiful objects (a few more were added by later astronomers)? What sort of person only looks for comets? Well look no further than Charles Messier.

The Messier objects are some of the most beautiful objects you will probably ever see, after all some of the most stunning sights are above you.

As you will know the objects vary from magnificent whirlpool galaxies to globular clusters. My favourite out of the list has to be M31. The Andromeda galaxy, which will collide with us in 3 billion years - this is not a nice thing to think about.

Let's talk more about Charles Messier. He was a French comet hunter. Between 1760 and 1798 he discovered 13 comets but occasionally he encountered celestial objects that looked like comets because they appeared fuzzy in his small telescope. He realised that none of these fuzzy so-called comets were moving so he started to wonder what they really were.

Astronomers called these fuzzy objects nebulae after the Latin word for cloud but the word has a more specific meaning these days. Messier discovered the first of his non-moving objects in Taurus on August 28th, 1758. This object became his first catalogue entry -M1.

Messier published three versions of the catalogue. The first, in 1769, contained 45 objects. He published the second, with 68 objects in 1780. The third, which listed 103 objects, appeared the next year. Later discoveries by Messier and other observers brought the tally up to 110 objects which we now call Messier's catalogue of deep sky objects.

Many observers have viewed all the Messier objects but you a 3-inch or more telescope to see them all. These are truly a set of some of the universe's greatest objects which should not go unseen, so get your telescopes out and start looking.



## The imagination of Youngsters

John Crowther received this postcard from his Grandson after he had visited the Herne Bay Museum. As you can see he has come up with a brand new, never before promulgated, method of propulsion in outer space. The formula apparently depends on eating a lot of chillies, the resulting equal and opposite reaction propels you through space.

Apparently the reaction force in his design exhausts from the ears. I remember the last time I ate chillies the reaction force certainly didn't exhaust from my ears.

*Editor*



## Possible Closure of Arecibo – another “Contact” lost?



The Arecibo Telescope uses radio and radar energy to explore the universe. Its massive dish, built in a natural depression in the jungles of Puerto Rico, measures 1,000 feet (305 meters) across and 167 feet (51m) deep. Its 40,000 perforated aluminum panels cover some 20 acres. Suspended 450 feet (137m) above the reflector is the 900-ton receiver platform. .

Arecibo, completed in 1963, remains the largest and most powerful radio telescope in the world. Radio astronomers have made important contributions to the study of asteroids. In a recent and notable example, astronomers used Arecibo and other radio scopes to confirm that miniscule nudges by photons of light can speed up or slow down asteroids' spin rates. The American government, Congress, is seriously considering budget cuts which may eventually cause closure of this icon observatory

## Paleaku Astronomy Center Launches The Galaxy Garden,

*Long-time artist collaborator of Carl Sagan maps the galaxy in plants and flowers in Hawaii.*



The Galaxy Garden, the world's first walk-through model of the Milky Way Galaxy, will open to the public on Oct. 21, 2007. Located on the Big Island of Hawaii, this 100-foot diameter garden accurately maps the galaxy using almost 1000 carefully selected plants to represent actual stars and nebulae.

The centerpiece of the model is a unique fountain that represents the giant black hole at our galaxy's center. Our Sun is located by a single small jewel on a leaf of the gold-dust croton plant, whose speckled leaves symbolize starfields. Nearby stars - other jewels - are positioned at the correct distance on our leaf. More distant objects, like the famous Orion Nebula, are shown to scale, just a few feet from our Sun, using colorful hibiscus flowers to represent these gorgeous cosmic clouds. Other esoteric features like the warp of the galactic disk, and the recently discovered "bar" at the galactic center will satisfy the expert viewer and allow the average visitor to grasp the geography and scale of our Milky Way as never before.

*(Hmm? Would Mrs Editor consider a different front garden layout?)*

## The Thomas Wright Trophy and Yorkshire Astromind

On 5 October, York A.S. hosted the annual Thomas Wright Trophy quiz competition, contested by CaDAS, York and Durham. Yours Truly was the Questionmaster. The contest was made a little more exciting this time, with the inclusion of two “on the buzzer” rounds; I’ve finally obtained a “proper” electronic lockout buzzer system.

Once again, CaDAS came home with the trophy. Our team consisted of Darran Summerfield, Rob Peeling and John McCue. After three rounds, York had taken the lead, but our trio pulled things back by performing brilliantly in the final buzzer round.

The final scores were: CaDAS 60 points, York 46, Durham 32.

The following day in Huddersfield, and again with me as Questionmaster, Darran narrowly failed to retain the prestigious Yorkshire Astromind championship. He came a very creditable second, being beaten by only two points. Darran held the lead through four rounds, but was pipped at the post in the final speed round, by Marcus Armitage of Huddersfield A.S., who has now achieved his hat-trick of victories.

## Transit Tailpieces

**Another 6” telescope for the Society** – Joe Gordon from Sunderland has very kindly donated his 6” Helios Newtonian with an equatorial mount, tripod and accessories to the Society for observing nights at the Planetarium.

Joe has recently upgraded to a 10” Meade LX200. The Society greatly appreciates his generosity in providing the “Gordon 6 inch Newtonian”.

**For Sale** – Meade LX90 8” Schmitt-Cassegrain , brand new still boxed, unused. With Autostar II GoTo; plus many, many accessories; total cost new £1997; for sale at £975: Superb bargain at this price.  
Contact Jack Youdale 01740 630249

**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](mailto: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,

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([b2mullen@hotmail.com](mailto:b2mullen@hotmail.com)) Copy deadline date is the 20<sup>th</sup> of each month.