



# TRANSIT

The Newsletter of



05 January 2008



Comet Holmes in colour by John Chumack

## Editorial

**Last meeting :** 14 December 2007.

“Ancient Astronomy and Modern Science” by Prof. Richard Stephenson of Durham University.

A very memorable talk by Professor Stephenson on his search through Babylonian clay tablets, Chinese, Japanese and Korean ancient texts, attempting to pin down descriptions of supernovae, comets and eclipses and their timings (some very strange methods of timing at that) and correlate the events with each other and our present calendar. A lot more difficult than it sounds. I have included an article this month featuring Professor Stephenson’s work.

**Next meeting :** 11 January 2008. Members’ Night – Volunteers needed!  
Let Neil know as soon as possible to grab a slot

## Aluminizing Mirrors

from Jack Youdale

Many of our modern telescopes are of the Cassegrain form, either Maksutov or Schmidt design. In both cases the optics are sealed within the telescope and the reflecting coatings are less prone to atmospheric deterioration. Also many of the reflecting surfaces in these telescopes have special coatings of multi-layers to enhance reflectivity. However, some of us still use the classical Newtonians or pure Cassegrain optics.

These telescopes have reflecting surfaces which are open to the atmosphere and therefore in time will deteriorate due to oxidization. A freshly aluminized surface will reflect some 90% of the image-forming light. To check your surfaces you can simply examine the surface by eye, carefully removing your mirror and look through the mirror towards a bright light. You will see a myriad of pin holes in the aluminium surface! If your mirror requires re-aluminizing you will be faced with the cost of packaging, postage and insuring your optics. Recently I have had an excellent job done locally so I will pass the information on to those who wish to use it.

Mr John Palmer until recently was employed at the Sinden Optical Co. in Newcastle. Since the death of David Sinden John acquired the aluminizing plant and has set it up in his home in Langley Park near Durham. His contact details are given below:-

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All the best for 2008, Jack

## **Ancient Chinese Astronomy: New insights from old information**

by Nigel Henbest

**China has the world's longest-running observations of the sky: though based in astrology, they are of unique importance to astronomy today.**

In 210 BC, the great First Emperor of China was buried near Xi'an with his famous Terracotta Army of full-sized clay warriors. According a contemporary account, his own tomb – yet to be excavated – was even more lavish, containing a fabulous double map: “Below was a map of the Earth. The hundred rivers of the Empire were modeled in mercury: cleverly designed machines made the rivers flow. Above everything was the starry vault.”

This map reflected the crucial role that the sky played in ancient Chinese thought. The heavens weren't remote from everyday life. The sky was a mirror of the Earth.

Every time that something unexpected occurred in the sky, it showed a disruption on the Earth – which, in effect, meant somewhere in China. To pinpoint exactly where, the Chinese split the stars into 283 small constellations, representing different parts of the Empire.

On 7 December, AD 185, for instance, Chinese astronomers spotted a brilliant new star and reported: “A guest star appeared within the Southern Gate. It was as large as half a mat; it showed the five colours and it scintillated.”

The Astronomer Royal alerted the Emperor, and decisive action was taken against the region corresponding to the Southern Gate. “The governor of the metropolitan region Yuan Shao punished and eliminated the middle officials... and several thousand people were killed.”

The Chinese astronomers kept watch from a raised platform, where four observers faced north, south, east and west; while a fifth lay on his back and looked straight upwards – surely the best job! The next morning they reported to the Astronomical Bureau, which kept records from 206 BC to AD 1912 – the longest-lived bureaucracy the world has ever seen.

Today, astronomers can mine this ancient archive for unique information on astronomical events.

### **New insights from old information**

British astronomer Richard Stephenson, who taught himself ancient Chinese and is now a leading expert on the astronomy of the Far East, has looked into the “guest star” of AD 185. He identifies the Southern Gate as the two bright stars Alpha Centauri and Beta Centauri. And he concludes that the guest star was so brilliant that it had to be a nearby supernova – the most violent kind of stellar explosion.

Led by the Chinese results, Stephenson has pinpointed where the explosion occurred. And here astronomers studying X-rays from the Cosmos with the orbiting Chandra Observatory have located the incandescent fireball still expanding from the 2000-year-old explosion.

“One of the key things is that you have a definite date,” Stephenson explains, “so you know precisely how long the remnant has been evolving.” The Chinese observations can also indicate how bright the supernova was. “In the case of a supernova seen in AD 1006,” Stephenson continues, “the Chinese said it was so bright that you could see things on the ground by its light.”

These ancient observations really come into their own with the supernova spotted in July AD 1054. A star exploded in the constellation we know as Taurus, shining so brilliantly it was visible in daylight for 23 days. Today, in this location we find the twisted wreck of the long-dead star: the Crab Nebula. It’s powered by a collapsed core of the old star, which lurks at the centre of the nebula as a pulsar – a super-dense ball of neutrons only 25 km across, spinning around 30 times a second.

Astronomers and physicists are short in understanding how neutron stars change as they grow older. With the Crab Pulsar, the Chinese observations provide a unique piece of information: the pulsar’s age. We know that it was born exactly 953 years ago. The Chandra Observatory has also pinpointed pulsars within supernova remnants that - according to Stephenson - are the fireballs from stars the Chinese saw explode in AD 386 and 1181.

Sometimes, the imperial astronomers were treated not to a guest star, but to a “broom star” – a fuzzy object that crawled across the sky, sweeping the sky with its tail. In 240 BC, they set down the world’s first record of the celestial visitor we now know as Halley’s Comet.

In AD 530, the Chinese recorded Halley’s Comet with more precision: “On 1 September, it was one degree to the northwest of Xiatai [a star in Ursa Major].” These early fixes on the comet’s orbit meant that European mission controllers could predict its 1986 apparition with greater accuracy, enabling them to send the Giotto spacecraft through the comet’s heart with unerring precision.

## Ancient Chinese Eclipse Predictions

The Chinese were also careful to record eclipses of the Sun – a portent of doom that would directly affect the Emperor or his family. “There was a total eclipse in 181 BC,” says Stephenson, “and the Emperor’s dowager was really alarmed by it: she died two years later.”

An eclipse features in the earliest astronomical record in the world, from the Chinese city of Anyang. Around 3000 years ago, a diviner inscribed a question on an oracle bone – a polished shard of animal bone: “Diviner Ge asks if the following day will be sunny or not.” He pushed in a red-hot needle, and interpreted the ensuing cracks.

Twenty-four hours later, the diviner inscribed the actual answer to the question. In this case, something rudely interrupted the sunshine: “Three flames ate the Sun, and big stars were seen.”

This is clearly an account of a total solar eclipse. The “flames” were the Sun’s outer atmosphere, the corona, with the brighter stars and planets becoming visible during the darkness of totality.

To astronomers’ eternal gratitude, Diviner Ge recorded that the eclipse fell on the 52nd day of the 60-day lunar month. In 1989, NASA researchers calculated when a total solar eclipse would have been seen in China on the 52nd day of any month. The only date that fits is 5 June 1302 BC – making this eclipse the most ancient exactly dated astronomical event.

This eclipse isn’t important only as a record-breaker. It reveals new information about the Earth’s rotation. Astronomers know that our day is gradually getting longer, due to the influence of the Moon’s gravity – that’s why we have to occasionally insert “leap seconds” to our clocks. But the rate of slowing isn’t constant.

By studying exactly where eclipses have been seen over the past millennia, Stephenson has tracked the variation in the Earth’s rotation rate. As well as the Moon’s influence, he has to invoke minute changes in the Earth’s shape as the surface bounces back from the weight of ice sheets that burdened northern lands during the last Ice Age: “especially in the area around the Gulf of Bothnia, the land’s still rising at quite a rate.”

These results are showing – in a way the ancient Chinese could never have predicted – that their scrutiny of the heavens has indeed been mirrored in the planet under their feet!

## Scientists Learn How to Deal with Rogue Asteroid Threats

By Dave Mosher

When it comes to 22-million-ton asteroids, the small stuff, it turns out, can make a huge difference in a potentially disastrous path toward Earth.

Using limited observations and lots of high-end computer modeling, astronomers have gotten a better handle on the limitations of asteroid-track forecasting in a new study of a potentially threatening asteroid called Apophis. In this high-stakes game of Whack-a-Cosmic-Mole, just knowing exactly what it is you don't know can be useful.

Apophis' chance of hitting our planet in 2029 is now slim to none, but astronomers will have to wait four to six years before they can predict what it might do during a second pass in 2036. A team of scientists arrived at the conclusion after accounting for small influences like the solar wind, gravitational drag of smaller asteroids and human error.

The rock is between 690 and 1080 feet (210 and 330 meters) wide. Until better measurements lower the uncertainties, its predicted path could be severely off, potentially thwarting proactive efforts to change its course.

### Uncertain future

In 2004, astronomers gave Apophis a frightening one-in-37 chance of striking the Earth in 2029, which later measurements from Puerto Rico's giant Arecibo radio observatory knocked down to a one in 45,000 likelihood.

Apophis is expected to make a comfortably distant encounter of about 30 million miles (47.9 million kilometres) with Earth in 2036. But its first path-bending pass in 2029—about three Earth diameters of our home—and other unknowns could greatly alter the asteroid's second approach seven years later.

In their study, to be detailed in an upcoming edition of the journal *Icarus*, astronomers examined hundreds of potential courses with computer simulations, then hashed out course-altering uncertainties after the first encounter. The largest such source of error is the sun's ability to push small asteroids around with solar radiation; in Apophis' case, up to 18.6 million miles (30 million kilometres) or about 2,350 Earth diameters off-course.

Other sources of course prediction error include:

- Small uncertainties in planetary masses and position, up to 11.5 Earth diameters of error.
- Earth's imperfect spherical shape, up to 1.5 Earth diameters of error.

- Gravitational influence of small asteroids, up to 1.7 Earth diameters of error.

Astronomers said looking at the rock via telescope is necessary to cut out most of the error, but won't be possible until 2011 or 2013, when Apophis comes out of hiding from behind the sun. Noting the shape, colours and rotation, not just current position, should cut out up to 97 percent of the uncertainty about the asteroid's future track.

A little goes a long way

Until then, scientists are dreaming up of cost-effective ways to redirect Apophis before 2029, should the need arise.

One recently proposed solution calls for strapping on a small reflective patch to the rogue body. By adding a 130-by-130 foot (40-by-40 meter) section of material that acts like a solar sail, Apophis could be pushed away by at least one Earth radius, or about 4,000 miles (6,400 kilometres)—more than enough to avoid cataclysm.

The reflective material doesn't have to be stuck in one place, either. Spreading a shiny mesh of carbon fibres over Apophis might nudge it away from Earth's path for good.

But a lack of good observations, astronomers warn, could turn such proactive deflections into disaster.

"Without such performance margin," the authors said, "the deflection action would instead create an unpredicted outcome or a new hazard."

## **Observing the Lunar Leibnitz Mountains**

From Michael Roe

Near the South Pole of the Moon an observer with a good telescope can see small irregular bumps on the mostly smooth edge of our satellite, these are the Leibnitz Mountains, the highest on the whole Moon!

The Leibnitz Mountains are actually part of a huge degraded impact basin called The South Polar Aitken Basin which is 1500 miles in diameter, second in size to the Procellarum Basin. It resembles that basin by being hardly visible but having only a few patches of Mare, dark lava flows where smaller basins such as Apollo have fractured the lunar crust. Even orbital images show little of the South Polar Aitken Basin, only a few mountain ridges in places and a depression with slightly less cratering than its surroundings, all on the Moon's hidden far side. But the small portion on the Earth-facing side is different, more prominent and higher,

26,000 ft to 30,000 ft mountains, very impressive and right on the edge or limb of the Moon so we can see them in profile.

As for the exact names, well – South Polar Aitken Basin! Surely astronomers could do better and, actually, Leibnitz Mountains is an old name seldom used on Lunar maps since the 1970's, seemingly ignored and forgotten. The reason was given that these mountains were really parts of large crater walls, actually basin walls is a more accurate term and that every lunar mountain range is part of some basin walls. A lava flooded crater in the middle of the South Polar-Aitken Basin has also been named Leibnitz, maybe the whole basin could be renamed the Leibnitz and still keep the same name for the mountains.

A large telescope shows the Leibnitz Mountains as a great rounded peaks like the well-known Mount Hadley, but twice as tall. There are craters around the mountains such as Cabeus, Newton, Amundsen, Scott and Shackleton named after famous Polar explorers.

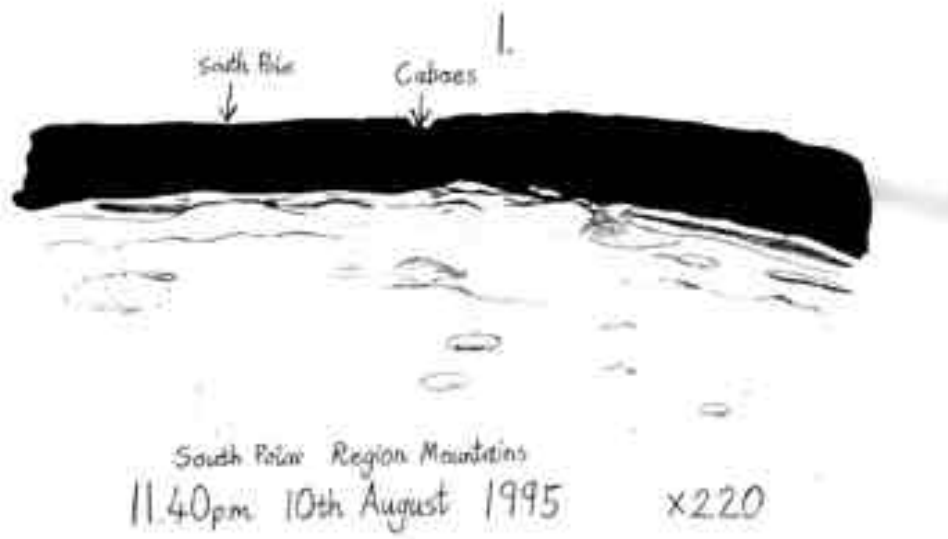
Because the Leibnitz Mountains are so high, possibly the highest on the Moon, and are right on the edge of the Moon's edge, we can see what lunar mountains really look like – impressive great rounded masses, also the inverted view of an astronomical telescope makes the mountains appear the right side up, so we get a distant version of the view an astronaut would see from the surface of the Moon.

As you can see, the Moon's libration, the slight wobbling from a true Earth-facing location, changes the view of the Leibnitz Mountains, bringing different ones into view at different times, making observing them more interesting. They are also some of the Moon's features best seen around Full Moon.

Part of the Leibnitz Mountains are in eternal sunlight due to the Moon's orbit being inclined about 7 degrees but neighbouring deep craters and valleys are in eternal darkness. There are spacecraft measurements interpreted as water ice in such places but confirmation would need a surface lander, not likely for many years!

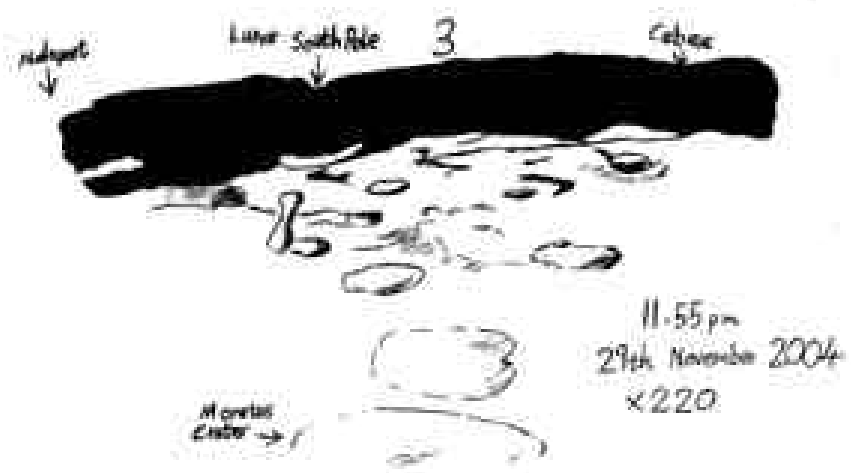
Anyway, the Leibnitz Mountains are a fascinating, ever changing place to observe, try it yourselves. Here are some of my telescopic Celestron 8" observations of them.





2.





Liebnitz Mountains  
x220  
1.05 am  
19th August 2003

All Drawings  
8" inch Celestron  
Schmidt Cassegrain

## Einstein's "Biggest Blunder" May Turn Out to Be His Greatest Success

Einstein was probably wrong about being wrong. In other words, Einstein was right even though he didn't know it. His self-proclaimed "biggest blunder" was a postulation of a cosmological constant (a force that opposes gravity and keeps the universe from collapsing) may actually be completely correct, according to the research of an international team of scientists. WOW. That means Einstein was so damn smart that even his biggest failure will likely turn out to be true.

This international team of scientists, including two researchers from Texas A&M are now working on a project called ESSENCE that studies supernovae (exploding stars) to figure out if dark energy – the accelerating force of the universe – is consistent with Einstein's cosmological constant.

So here's how the whole "blunder" situation developed. In 1917, Einstein was working on his Theory of General Relativity and was trying to come up with an equation that describes a static universe – one that stands still and does not collapse under the force of gravity in a big crunch. In order to keep the universe static in his theory, Einstein introduced a cosmological constant – a force that opposes the force of gravity.

Then, 12 years later, Edwin Hubble discovered that the universe is not static – it is actually expanding. So Einstein scrapped his idea of a cosmological constant and dismissed it as his biggest blunder.

In 1998, however, two teams of scientists, one of which Texas A&M researcher Nicholas Suntzeff co-founded, discovered that the universe is not only expanding, but its expansion is actually accelerating – going faster and faster.

"So there had to be some other force that had overcome the force of gravity and is driving the universe into an exponential acceleration," Suntzeff explained. This opposing force is what scientists now call dark energy, and it is believed to constitute roughly 74 percent of the universe. The other constituents of the universe are dark matter, which composes about 22 percent of the universe, and ordinary matter, which is about 4 percent.

"Eighty years later, it turns out that Einstein may have been right [about a cosmological constant]," fellow Texas A&M researcher Kevin Krisciunas added. "So he was smarter than he gave himself credit for."

The researchers will look at what is called the redshift of the supernova, which tells them how fast the universe is expanding. When scientists compare the distance of the supernova to its redshift, they can measure the acceleration of

the expansion of the universe. This acceleration is caused by the force scientists call dark energy.

The ESSENCE team can then use the value of the acceleration to figure out the density of dark energy, which they then use to calculate what is called the  $w$ -parameter. For Einstein's cosmological constant to be correct, the  $w$ -parameter must equal  $-1$ , and so far, the results of the ESSENCE project seem to confirm that Einstein was right.

"The magic value is  $-1$  exactly," Krisciunas said. "If the number turns out to be precisely  $-1$ , then this dark energy is a relatively simple thing – it is Einstein's cosmological constant." The team won't have the final results until later next year, but right now, the measurement is coming in at  $-1$  plus or minus 10 percent error, Suntzeff said, so the initial points to Einstein having been correct all along.

Suntzeff is excited to see what else their research will yield. "Dark energy is completely unexplained by conventional physics. Perhaps this is a manifestation of the 5th dimension from string theory. Or maybe it is a new vacuum energy density that is changing slowly in time. We have no idea, and that is what excites both physicists and astronomers."

## Holmes Comet in 1892

from Geoff Gaherty

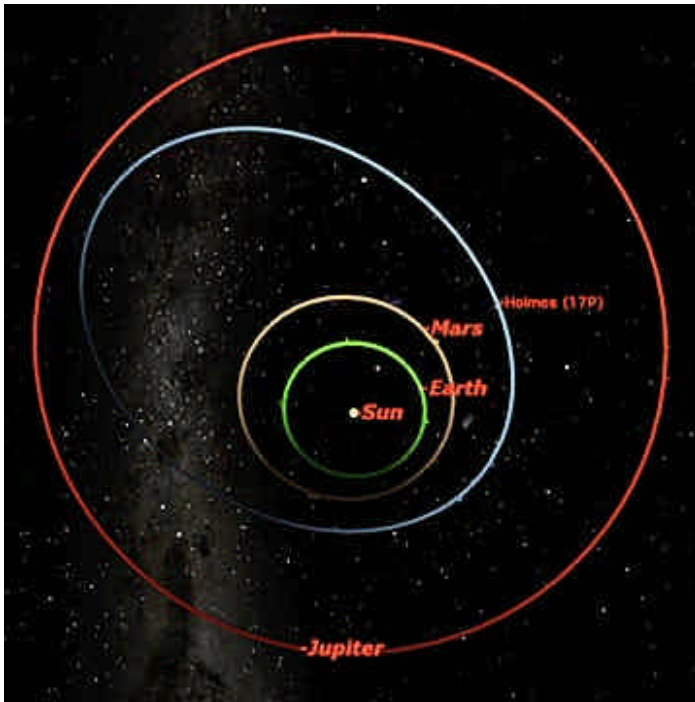
If you've been following the astronomy groups on the internet lately, you will certainly have heard of the strange case of Comet Holmes (17P). This periodic comet was discovered in 1892 by Edwin Holmes. After discovery it slowly faded from view in the largest telescopes until one night it suddenly popped up to fourth magnitude, close to the Andromeda Galaxy:



*Comet Holmes photographed on 1892 November 10 by E. E. Barnard. The Andromeda Galaxy is at upper right, Mu Andromedae at lower left, with the comet just to the right of it.*

On October 23, 2007 Comet Holmes repeated this performance, suddenly going from magnitude 16 to magnitude 2.7, an increase in brightness of close to a million times! This time, it chose another picturesque background for its performance: the brilliant and rich Alpha Persei Cluster. In both cases, the comet had a decidedly un-comet-like appearance: no noticeable tail, looking just like a giant planetary nebula. It followed its spectacular brightening by an equally spectacular enlargement in size, which fooled many observers into thinking it was streaking straight towards us, its tail hidden behind it like the freight train behind a looming locomotive.

We can use the Starry Night program to determine what was really going on. Starry Night has a large number of preset “Favorites” which can help us visualize events taking place in space. With a little bit of tinkering, we can take the Inner Solar System favourite and add the orbits of Jupiter and Comet Holmes to it; for the sake of clarity I’ve deleted Venus and Mercury. The situation with Holmes immediately starts to become evident.



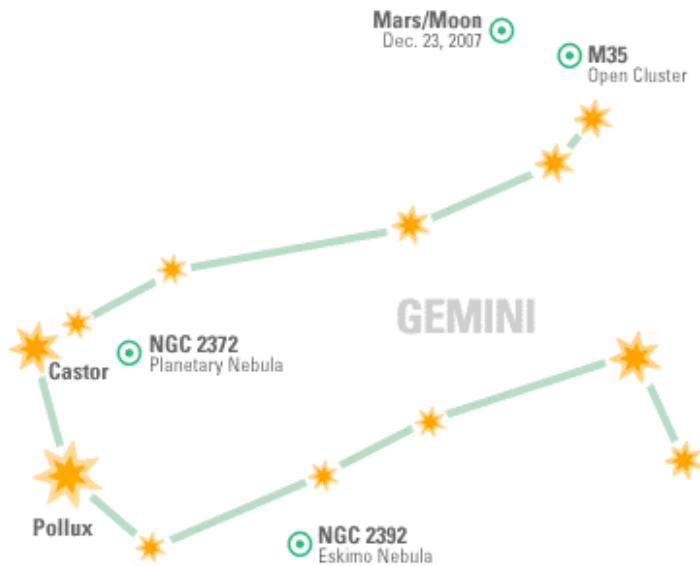
*Orbital positions on 2007 October 23, when the Holmes outburst occurred. All the planets and the comet are moving counterclockwise around the Sun from this view from above the Sun’s north pole.*

First of all, notice that, like all comets, Holmes has a noticeably elliptical orbit. Secondly, this orbit lies far from the Sun, between the orbits of Mars and Jupiter, in what we usually think of as “the Asteroid Belt.” Thirdly, Holmes is nowhere near perihelion, the point in its orbit closest to the Sun. In fact, it passed perihelion in early May, and was retreating rapidly from the Sun by October. So this outburst was not caused by the Sun’s heat. Because the Earth is closer to the Sun than the comet, it is moving faster around the Sun.

The result of this is that, even though the comet was retreating from the Sun, it was actually getting very slowly closer to the Earth, but the change in distance in two weeks between Earth and Holmes was less than one percent. Thus the rapid enlargement observed with Holmes was due to its actually increasing in physical size, not a perspective effect caused by decreasing distance between the two.

Notice that Holmes’ tail is pointing away from the Sun, in the direction of the solar wind, as is normal. Seen from the perspective of Earth, the tail is streaming out behind the head of the comet, and so is hidden from us; hence Holmes’ round tailless appearance.

## Constellation Gemini



**Gemini** is well placed for observations in January, floating high overhead in the south-east by late evening.

**Castor**, 47 LY away, is an astounding multiple star consisting of six separate components. In a small telescope you can see a true double of 1.9 and 2.9, the stars revolve around each other every 510 years. The separation is increasing and become easier to split towards the end of the 21<sup>st</sup> Century.

Close by is **NGC 2372**, a faint planetary nebula that looks like a mini-dumbbell.

**Pollux**, 361 LY, at 1.1 is the brightest star in Gemini although named beta Geminorum, was possibly fainter than Castor at one time but it is now thought Johann Bayer in 1603 just made a mistake in his observations.

Castor and Pollux are 4.5 degrees apart, very handy as a yardstick for measuring angular distances.

**The Eskimo Nebula (NGC 2392)**, photographed so magnificently by the Hubble Space Telescope, is also known the Clown Face Nebula. At 8<sup>th</sup> mag only large scopes bring out the details you would associate with a face, but it's a fun target nonetheless. It is 3000 LY away.

**M35 (NGC 2168)** is a lovely 5<sup>th</sup> mag open cluster by Gemini's left foot, covering the same area of sky as the Moon, with a smaller, dimmer but rich companion cluster **NGC 2158**; physically unrelated, they just happen to lie along the same line of sight.

## Is Earth the New Venus?

from Doug Aamoth



Back in 2005, the European Space Agency launched Venus Express, a 2800-pound orbiter that found evidence of lightning on our nearest neighbor. Venus expert David Grinspoon says that data suggests about 50 lightning flashes per second, which is about half of the rate here on Earth.

Also compelling is the idea that Venus may have at one time been covered with water, about as much water as Earth. Scientists announced today that they have found evidence of Venus' scorching hot surface and weak gravitational pull allowing hydrogen and oxygen to escape into the atmosphere. It's been known for a while that hydrogen had been escaping but the discovery of oxygen escaping is much more recent. Said Grinspoon, "Learning about the escape rates of hydrogen and oxygen will help us reconstruct how much water Venus had in the past. Venus may have lost at least up to an Earth's ocean's worth of water."

Grinspoon is the author of a book called *Life on Venus* wherein he claims that Venus may have been the most hospitable planet at one time. How about that? It's thought that about four billion years ago, the sun put out a little more than half the amount of heat that it does today. Earth and Mars were likely big hunks of ice while Venus, much different from the great ball of heat it's become today, was probably in a nice, stable hospitable zone. Add an Earth-sized ocean and voila, you've got yourself Earth, Venus-style.

"There is some reason to believe Venus may have been the best haven for life in the early solar system," says Grinspoon. "Venus is the closest thing Earth has to a twin. Studying Venus is how we learned about the problem with our ozone layer, and it's a way for us to become wiser in taking care of our own planet."



I'll probably never know if there was intelligent life on Venus at one point in time and I'm not trying to make a claim for or against it, but I've personally been fascinated by the idea of past civilizations ever since I saw this chart (see below). It's a chart of the amount of time it would take to cover any trace of a civilization after it disappeared. It would take a mere 1000 years for most brick and mortar buildings to fall apart and about 50,000 years for just about everything else to vanish. That's a blink of an eye considering our solar system, as we know it, is thought to be over five billion years old. Imagine, just imagine, the possibilities of long-lost life on our sister planet.

Who knows? Maybe Earth really is the new Venus.

## Mars is Hell!

Mars is a weird planet. It is cold and extremely dry today, but the geology and topography indicate it was much warmer and wetter in the past. That means its atmosphere must have been thicker a billion or two years ago. To sustain water, there must have been some sort of greenhouse gas to hold in the heat.

On Earth, we have carbon dioxide fulfilling that role (and methane, and water vapor). Scientists have assumed that the Martian atmosphere must have had quite a bit of CO<sub>2</sub> back then to keep it mild, and in fact the thin air is mostly CO<sub>2</sub> now.

But if that were true, where did it go? The total amount of CO<sub>2</sub> must have dropped by a huge amount over the eons, and the most likely place it would be is trapped in carbonate rocks.

One teensy problem: those carbonates aren't there, at least not in the amounts needed. You'd expect there to be limestone all over the planet's surface, but there isn't. Instead, the rovers found evidence of sulfur-rich rocks; jarosite is common on the surface, for example.

This has led scientists at MIT and Harvard to suppose something a bit radical: instead of CO<sub>2</sub>, maybe there was lots of SO<sub>2</sub> — *sulphur* dioxide — in the early Martian air. This idea is a twofer: it explains the high sulfur content on the planet, and it also explains why there are few or no carbonates. Sulfur dioxide inhibits carbonate formation.

Mars clearly had lots of standing water on its surface long ago. If the air had SO<sub>2</sub> in it, it would dissolve easily (much like CO<sub>2</sub> does). The oceans would have become acidic, a solution of sulphuric acid. When the oceans dried up this sulphur rich water formed the jarosite.

In a sense, this mimics Earth's carbon cycle, where CO<sub>2</sub> in the air dissolves in the water and forms carbonates like limestone. But Mars... well, it's *different*. It's sometimes easy to forget that, which is why scientists have been thinking carbon all this time.

The primitive Mars much have looked very different. Before iron oxide tinted it red, and before the water all disappeared, what did it look like? Orange, or yellow, with its high sulphur content? One thing I can be fairly sure of: it would have smelled bad. Sulphur is the main ingredient in hydrogen sulphide, for one.

## The Astronaut Wives' Club

By Sarah Cuddon



Valerie Anders (left) and Susan Borman hear their husbands from space

**Isolation, divorce, suicide - the cost of Nasa's mission to reach the Moon was borne heaviest by the wives of the astronauts. In their struggle to cope they formed their own support network.**

"Nasa wanted perfect wives, perfect children, perfect homes. There was certainly some pressure there." Susan Borman, Apollo 8 wife.

At the height of the Apollo space programme of the 1960s, many would-be astronauts aching to be picked believed that their selection was largely based upon the success of their marriages. Marriage, it seems, was one of the rules of astronaut selection.

The adventures of the men have, of course, been told many times. They became heroes and household names. But the women who were left on Earth have, for the most part, remained silent about their experiences of this extraordinary period.

Many of them formed extremely close friendships with each other which have endured to this day in the form of reunions for what must be one of the most select societies ever - the Astronaut Wives Club.

"It's interesting to me that the women have remained closer than the men," says Faye Stafford, former wife of Apollo 10 astronaut Thomas Stafford.

"There was just so much intense competition between the men I think it's still difficult for them to handle that."

But being the wife of an astronaut was often a fraught and lonely affair. Most of them had been military wives. When their husbands joined Nasa they suddenly found themselves thrust into a terrifying public arena. They were expected to attend fashion shows and charity events, offer political opinions on current affairs and act as role models for good Americans.

It wasn't for the faint hearted.

### **Media spotlight**

"None of us were prepared for the exposure," says Ms Stafford . "I'm shy. I didn't like all the attention. And those dinners. I used to call them those 'casts of thousands dinners'. But you wanted to support your husband and so you did it."

Just as the media today pursue families of troops in the Gulf, for any sniff of a story, the Apollo programme, which ran from 1961 to 1975, provoked a relentless and remorseless media frenzy.

Wives of astronauts had to maintain their composure for a worldwide audience at some of the most stressful moments in their lives. While their husbands were strapped inside a giant rocket, television crews and newspapermen would crowd the front lawns and build temporary towers to transmit the family's reactions to the world.

"Some of them actually moved into the home so they could photograph us watching the launches on television. We used to call it the death watch", says Susan Borman.

None of the women had careers. The astronaut wives' existence mostly meant you stayed at home and took the responsibility away from your husband so he could function in his highly competitive world.

"Most of us were still homemakers. I would have liked to have had a career. Especially once the children left home. It was isolating," says Ms Stafford.

### **Average pay**

"Sometimes a protocol officer at Nasa would summon us to give us advice such as give your husband a good breakfast everyday and make sure you keep him

away from stress at home. But on the whole we weren't given much support from Nasa," says Valerie Anders, Apollo 8 wife.

And contrary to what many people thought, astronauts were not exorbitantly paid; they and their families got by on military or government salaries.

"They were sending us into Houston society. It was all hats and gloves," says Ms Stafford. "I don't think they took into account that we were on government salaries and we really couldn't afford it all."

It was during this period that the Astronaut Wives' Club was born, a place where the women behind the Apollo astronauts could share the personal and emotional impact of the intense schedules and heavy public scrutiny they received and find the support they desperately needed.

They would gather for coffee or go and sit with whoever had a husband who was on a launch.

"We kind of filled in for each other when the men were away. We'd have dinner together and look after each other's children," says Gracia Lousma, wife of astronaut Jack Lousma.

But for many couples the reality of the space programme was a harsh one.

Far from being part of the "All American Dream", the Apollo programme was actually pulling them apart.

In the case of Dotty Duke, wife of astronaut Charlie Duke, the loneliness led her to a state of such despair that she considered taking her own life.

## **Suicide**

"Charlie was a complete workaholic. The space programme was all he thought about. I knew he would never be able to show me the love I needed or make me a priority and I became suicidal," she says.

But there was a perception among some at Nasa that the image of the astronaut as family man, as good husband, had become so important to the public profile of being an astronaut that it was essential to remaining in the programme.

"There were many couples who were staying together merely to keep up the appearance," says Ms Duke. When the first divorce hit the programme it shook the astronaut community but it also opened the gates. Quite quickly more and more couples started to separate.

"I used to go outside and just look up at the Moon," says Ms Stafford. "It was hard for us wives to understand what the men were really experiencing. And of course they were treated like royalty. It was hard for them to come home. What could ever compete with that? I was lucky if I could come second."

## Saturn's 'UFO' Moons

by Casey Kazan.



Strange flying-saucer-shaped moons embedded in Saturn's rings have baffled scientists studying images transmitted by the ESA's Cassini Spacecraft. New research suggests that the oddly shaped moons, Pan and Atlas, are born largely from clumps of icy particles in the rings themselves, a discovery that could shed light on how Earth and other planets formed from the disk of matter that once surrounded our newborn sun.

Observations by NASA's Cassini spacecraft revealed the moons Atlas and Pan, each roughly 12 miles (20 kilometers) from pole to pole, have massive ridges bulging from their equators some 3.7 to 6.5 miles (6 to 10.5 kilometers) high, giving them the classic Earthly UFO appearance.

At first glance, one could assume that fast rates of spin might have stretched Atlas and Pan out into such unusual shapes, just as tossing a disk of pizza dough flattens it out. But astronomers discovered that each takes about 14 hours to complete a rotation -not nearly fast enough to cause the flattened, disk-like shape.

Carolyn Porco, a planetary scientist at the Space Science Institute in Boulder, Colo., and her colleagues suspected these peculiar moons could be formed mostly from Saturn's rings, rather than just from fragments produced in collisions of larger moons. The location of the ridges lined up precisely with the rings of icy particles in which they were embedded, findings which are detailed in the Dec. 6 issue of the journal *Science*.

After analyzing the shapes and densities of the moons from data captured by Cassini, Porco's team now finds Pan and Atlas appear to be mostly light, porous, icy bodies, just like the particles making up the rings. Computer simulations suggest one-half to two-thirds of these bizarre moons are made of ring material,

piled up on massive, dense fragments of bigger moons that disintegrated billions of years ago after catastrophic collisions with one another.

Astrophysicist Sebastien Charnoz at University of Paris Diderot, the lead author of a related new study—also described in the Dec. 6 issue of Science, suggests that the Saturnian ice-clump moons elongated and bulged out into the flying-saucer shapes in the manner of accretion disks, which "are found everywhere in the universe—around black holes, around stars, around Jupiter."

Charnoz added that understanding how the icy particles piled up to make these shapes could shed light on how matter in the protoplanetary disks of our Solar System that formed around our newborn sun could have clumped together to make planets.

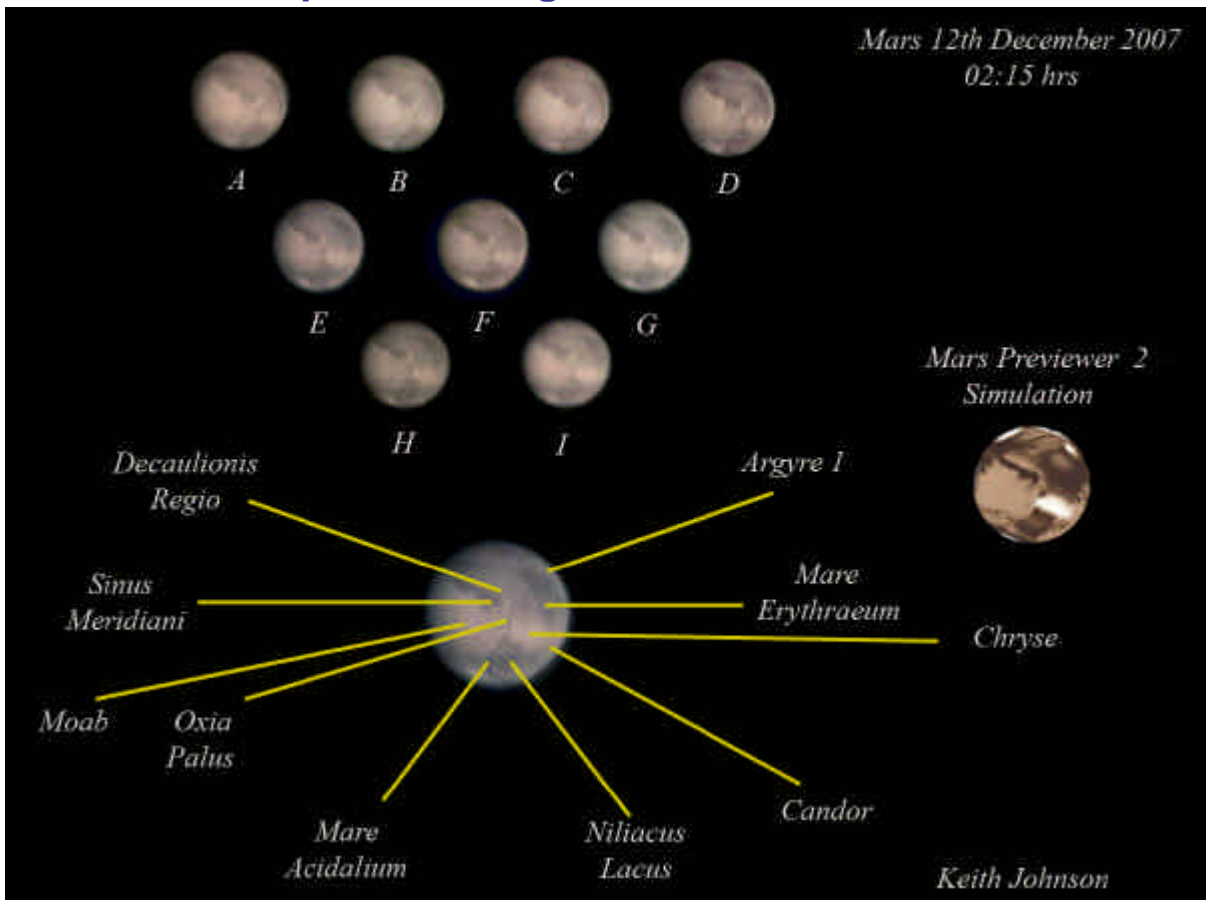
## Transit Tailpieces

**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](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,

18 Chandlers Ridge, Nunthorpe, Middlesbrough, TS7 0JL, 01642 324939 ([b2mullen@hotmail.com](mailto:b2mullen@hotmail.com)) Copy deadline date is the 20<sup>th</sup> of each month. ).

## Multiple Mars Images from Keith Johnson



Here are the final results from my Mars imaging session carried out on the 12th December.

AVI results A,B,C,and D were captured using a 2x Barlow.

AVI results E,F,G,H and I were captured using the 2.5x Powermate and 2x Barlow combined and the images were then reduced in size.

a 5x Powermate is ideally what I need.. or a bigger aperture!!

The original size of the 2.5x Powermate and 2x Barlow can be seen in the image displaying the surface details.

### Equipment :

C 9.25 " f/10 Celestron

2.5 x Powermate.

Toucam Pro.2 camera.

Infra red blocking filter.

2 x Barlow

EQ6 Pro. Mount controlled via. Skymap Pro.

Happy New Year to you all. Keith Johnson

## Contents – January 2008

Aluminizing Mirrors.....	page 2
Ancient Chinese Astronomy.....	page 3
Rogue Asteroid Threat.....	page 6
Observing the Leibnitz Mountains .....	page 7
Einstein’s Biggest Blunder.....	page 11
Holmes Comet in 1892.....	page 13
Constellation Gemini.....	page 15
Is Earth the New Venus.....	page 16
Mars is Hell.....	page 17
Astronauts Wives Club.....	page 18
Saturn’s UFO Moons.....	page 21
Mars Multiple Images.....	page 23

(reason for Contents page at rear of Transit – for those who receive a print copy a quick glance at the cover shows the contents, helpful if you archive the Transit)