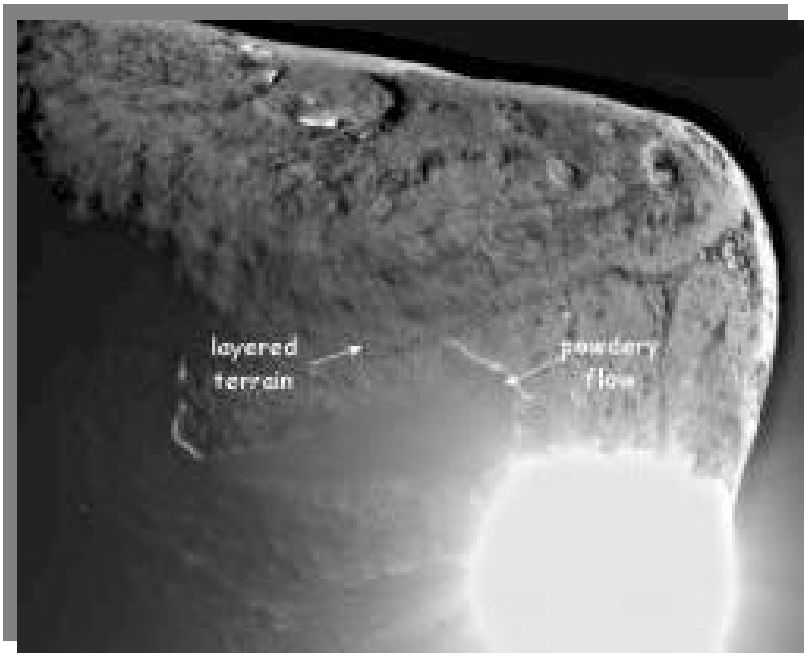
TRANSIT

The Newsletter of

Cleveland & Darlington Astronomical Society

05 October 2007



Remember Deep Impact when it smashed into Comet Tempel 1, it did its job well… too well. It carved out a crater visible from Earth but with too much debris to see the effect. Another spacecraft – Stardust, still in orbit - is on its way to image the leftover crater. Stardust looked at Comet Wid 2 wayback and dispatched its aerogel catcher back to Earth. It is now travelling towards Tempel 1 to have a re-look at the impact.

Editorial

Last meeting : Friday 14 September 2007. Dr John McCue on "Using Remote Telescopes". John introduced the use of remote observing via the Internet to the area schools through his early connections with Telescopes in Education (TIE). He commenced using the 24" and 14" telescopes on Mt Wilson in the USA.

Since the TIE withdrawal from California he has regularly used their telescope in Las Campanas, Chile. He described the research he is personally conducting on both asteroids and double/multiple stars using his recent Chile images and comparing any motional changes with the DSS (digitized Palomar Survey, images taken in the 1950's), with hopefully some fascinating new discoveries for science.

Next meeting : Friday, 12 October, 2007 October. The CaDAS Planetarium Show by Dr. Ed Restall, Director of Wynyard Planetarium
At the Wynyard Planetarium

----------000000000000----------

Do you remember the days of astronomy before computers made an appearance? If I really stretch my aging memory back that far I can just remember my first Norton's Star Atlas. This was my only guide to the sky, I was thousands of miles and almost an astronomical aeon from monthly magazines such as Sky and Telescope and Astronomy, they just didn't fit into the cleft stick of the local postal service.

My first erroneous efforts at star-hopping using Norton often had me observing at some ridiculous distance from my intended target but, hey, it was interesting whatever it was and as a result I discovered some fantastic objects, only finally named when I returned to my well-lit study with the Norton and discovered where I really was in the universe. In looking up the Norton star maps you just couldn't finger past all that fascinating information contained within the text pages without delving.

I think Norton contained so much information relevant to the amateur astronomer I often wonder why I ever turned to the easy-peasy path of the Internet. In the fine focus of an internet search the mind no longer has the leisure to linger over the varied information of the written word (remember dreamily wandering through Burnham's stellar poetry and his crazy meanderings about who knows what in his tri-volume of Celestial Handbooks – mad as a bucket full of frogs he was).

I keep telling myself that one day I will go back there. I will dismiss the planetaria programs that print out red-light friendly star-maps, downloadable guides as to

what to watch that night, the totally precise tables of ephemera of barely seen asteroids and comets – get a life Bob, get a life! *Editor.*

Contents – October 2007

Letters to the Editor :

Dear Editor,

Perhaps you were expecting a reply to Neil's article in the September Transit. Should Transit ban politics, sex and religion?

John Crowther

See John's response to Neil's article later in the magazine. BTW I'm grateful for any articles written by members (if necessary on any subject), they are so much more refreshing than cut and paste Internet articles written by professional hacks. Ed.

Dear Editor,

I am sure that many of our member will have been aware that for sometime now the most recent copies of Transit have not been available to download on our website. This is primarily because we have run out of storage space on the server that currently hosts the planetarium website. We have had a new Beta site under development with the education department of the local authority, but delays in launching this site persist and it doesn't look as though it will happen anytime soon.

To resolve this issue I have migrated all of the Transit archive to the Wynyard Woodland Park website. There should be no discernable difference in the way that access to the archive works, access is still via the planetarium website www.wynyard-planetarium.net under the Society menu button, by selecting the Transit Magazine menu item then scrolling down to the Transit that is required and clicking on it.

The archive is now fully up-to-date and I'm fairly sure it's functioning correctly. If anyone thinks otherwise could they please contact me with my webmasters hat on at webmaster@wynyard-planetarium.net

Many thanks for everyone's patience on this one,
Ed Restall

----------000000000----------

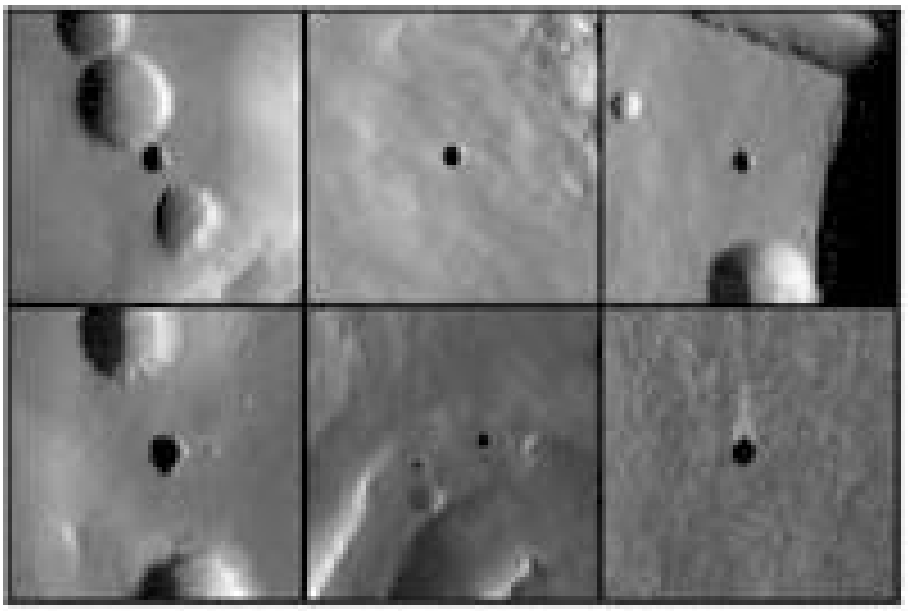
If the automobile had followed the same development cycle as the computer, a Rolls-Royce would today cost £100, get a million miles per gallon, and explode once a year, killing everyone inside.

Robert X. Cringely, Computerworld

Cave Skylights Spotted on Mars

September 21, 2007: NASA's Mars Odyssey spacecraft has discovered entrances to seven possible caves on the slopes of a Martian volcano. The find is fueling interest in potential underground habitats and sparking searches for caverns elsewhere on the Red Planet.

Very dark, nearly circular features ranging in diameter from about 328 to 820 feet puzzled researchers who found them in images taken by NASA's Mars Odyssey and Mars Global Surveyor orbiters. Using Mars Odyssey's infrared camera to check the daytime and nighttime temperatures of the circles, scientists concluded that they could be windows into underground spaces.



Above: A montage image of the "Seven Sisters"--seven dark openings into cavenrous spaces on the slopes of Arsia Mons. Researchers have nicknamed the features Dena, Chloe, Wendy, Annie, Abby, Nikki and Jeanne.

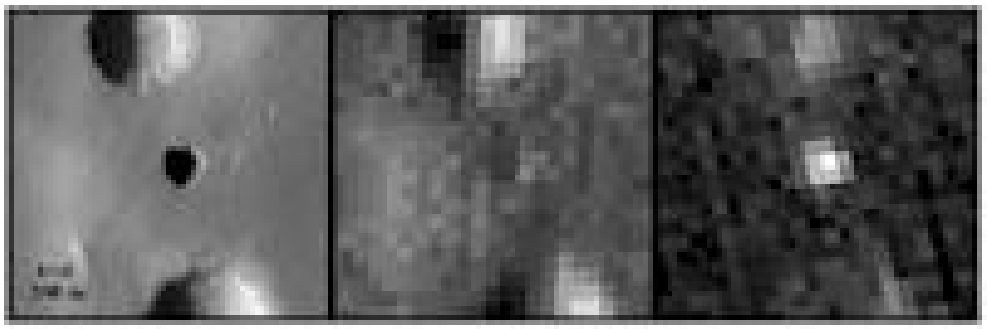
Evidence that the holes may be openings to cavernous spaces comes from the temperature differences detected from infrared images taken in the afternoon vs. the pre-dawn morning. From day to night, temperatures of the holes change only about one-third as much as the change in temperature of surrounding ground surface.

"They are cooler than the surrounding surface in the day and warmer at night," said Glen Cushing of the U.S. Geological Survey's Astrogeology Team and of Northern Arizona University, Flagstaff, Ariz. "Their thermal behavior is not as steady as large caves on Earth that often maintain a fairly constant temperature, but it is consistent with these being deep holes in the ground."

A report of this discovery by Cushing and his co-authors was published online recently by the journal Geophysical Research Letters.

"Whether these are just deep vertical shafts or openings into spacious caverns, they are entries to the subsurface of Mars," said co-author Tim Titus of the U.S. Geological Survey in Flagstaff. "Somewhere on Mars, caves might provide a protected niche for past or current life, or shelter for humans in the future."

The discovered holes, dubbed "Seven Sisters," are at some of the highest altitudes on the planet, on a volcano named Arsia Mons near Mars' tallest mountain.



Above: *Each of the three images covers the same patch of Martian ground centered on skylight "Annie," which has a diameter about double the length of a football field. The left panel shows an ordinary white light view of Annie; right panels show infrared images in mid-afternoon (center) and just before sunrise (right)*

"These are at such extreme altitude, they are poor candidates either for use as human habitation or for having microbial life," Cushing said. "Even if life has ever existed on Mars, it may not have migrated to this height."

The new report proposes that the deep holes on Arsia Mons probably formed as underground stresses around the volcano caused spreading and faults that opened spaces beneath the surface. Some of the holes are in line with strings of bowl-shaped pits where surface material has apparently collapsed to fill the gap created by a linear fault.

The observations have prompted researchers using Mars Odyssey and NASA's newer Mars Reconnaissance Orbiter to examine the Seven Sisters. The goal is to find other openings to underground spaces at lower elevations that are more accessible to future missions to Mars.

----------000000000000000----------

For a long time it puzzled me how something so expensive, so leading edge, could be so useless, and then it occurred to me that a computer is a stupid machine with the ability to do incredibly smart things, while computer

programmers are smart people with the ability to do incredibly stupid things. They are, in short, a perfect match.

Bill Bryson

Scores ill in Peru 'meteor crash'

Story from BBC NEWS: Published: 2007/09/19 00:18:50 GMT

Some 600 people in Peru have required treatment after an object from space - said to be a meteorite - plummeted to Earth in a remote area, officials say.

They say the object left a deep crater after crashing down over the weekend near the town of Carancas in the Andes.

People who have visited scene have been complaining of headaches, vomiting and nausea after inhaling gases.

A team of scientists is on its way to the site to collect samples and verify whether it was indeed a meteorite.

'Afraid'

"It the object is buried in the earth," local resident Heber Mamani told the BBC.

"That is why we are asking for an analysis because we are worried for our people. They are afraid. A bull is dead and some other animals are already sick," he said.

The incident began on Saturday night, when people near Carancas in the Puno region, some 1,300km (800 miles) south of Lima, reported seeing a fireball in the sky coming towards them.

The object then hit the ground, leaving a 30m (98ft) wide and 6m (20ft) deep crater.

The crater spewed what officials described as fetid, noxious gases.

An engineer from the Peruvian Nuclear Energy Institute told the AFP news agency no radiation had been detected from the crater and ruled out the fallen object being a satellite.

Renan Ramirez said: "It is a conventional meteorite that, when it struck, produced gases by fusing with elements of the terrain."

The gases are believed to have affected the health of about 600 people who visited the site.

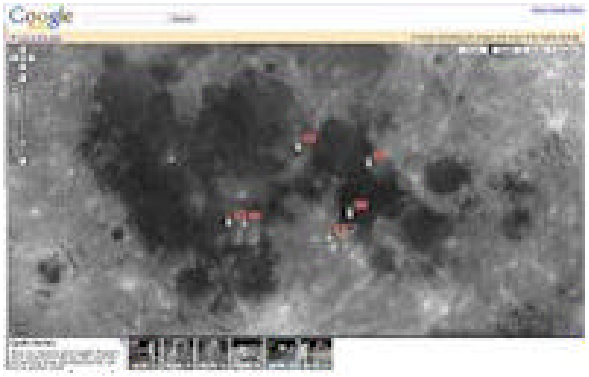
Most of the victims have been complaining of headaches, vomiting and nausea.

Honorio Campoblanco, one of Peru's leading geologists, called on the authorities to stop people going near the crash site.

Postscript 2007-09.29: The cause of the illness was later attributed to the considerable amount of arsenic I the ground water. The heat of the impact released gasses from the impact area and affecting visitors to the impact site. Geological study confirmed the impactor was a meteorite. Ed

Google Moon Gets a Big Update

from Fraser Cain



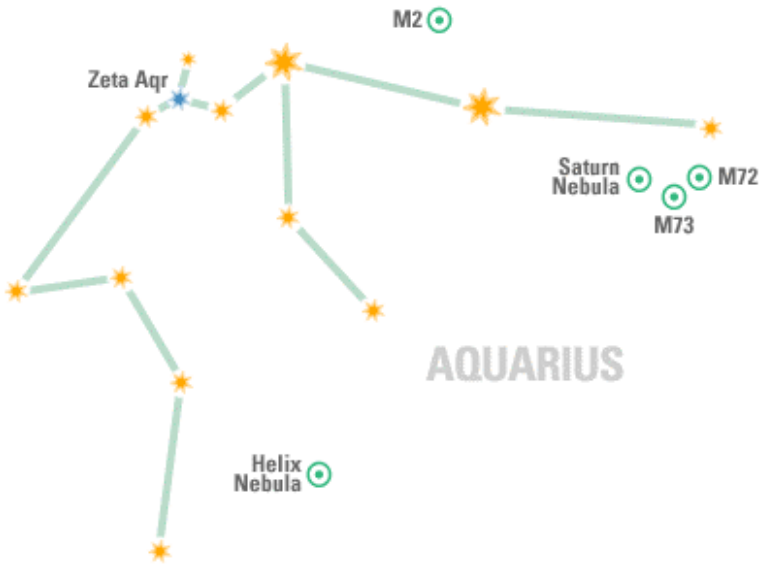
When Google Moon was released last year, it was a bit of a joke. Google Earth, but for the Moon. Zoom in far enough and the familiar lunar craters were replaced with swiss cheese. The time for silliness is over, Google Moon has gotten an update, and they're making it a serious learning tool this time around. The website incorporates photographs from orbiters and the Apollo missions to let you zoom in and out, exploring the Moon.

Head over to Google Moon, and follow along. You can change the view between Charts, Apollo, Visible and Elevation. All of the Apollo landing sites are marked on the map, so you can click each one to get more information.

Zoom in all the way, and you don't see swiss cheese anymore. Instead you see the most detailed images available from NASA showing high resolution details about the landing sites. Each landing site has more than 10 additional detailed place markers, showing points of interest about the mission.

For example, click on the Apollo 16 mission, and the interface informs you there are 21 additional place markers. Click to zoom in, and you can see all the little markers. Click on any one and you'll see more details, such as interesting rocks, craters, and landing spacecraft. Some of the detailed views are just photographs, but others are panoramas that you can scroll around to see the landscape from the astronauts' point of view. Very cool!

Constellation Aquarius



At this time of the year, as seen from mid-northern latitudes, Aquarius glides low above the southern horizon, between Capricorn to its West and Cetus to its East.

The Saturn Nebula (NGC 7009) is an oval Mag 8 fuzzy patch hanging in space about 4,000 lightyears distant. Medium-sized scopes show a ring with "knobs" on either side.

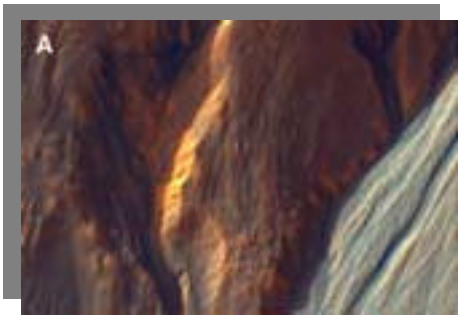
M72, close by, is a small remote globular cluster, difficult to resolve. The open cluster **M73** is a tiny triangular collection of stars, barely noticeable. However, the same field of view contains a lovely Lyra-like asterism.

The Mag 7 globular cluster **M2** is about 40,000 light years away. Although among the brightest of globs in the sky, M2's core is so concentrated that, as an observational object, it ranks as one of the less compelling.

The Helix Nebula (C63/NGC 7293) is a tricky target. Although it is the largest visible planetary in the night sky (about half the apparent diameter of the full moon) it's quite dim. Dark skies are a must. A low-power eyepiece in your telescope, with averted vision, may give you some hint of structure.

Finally, at 103 lightyears distant is one of the sky's finest doubles, **Zeta Aquarius**.

Mars - Hope for water dims with sharp new images



New images obtained by a sharp-eyed Martian satellite reveal that some Red Planet features once thought to have been carved by flowing water were in fact created by other processes.

The images were taken during the first 100 days of the Mars Reconnaissance Orbiter (MRO) mission and are detailed in a special section of the Sept. 21 issue of the journal *Science*.

While the results don't confirm or deny the existence of liquid water on Mars' surface, they are no less fascinating, say the scientists involved. For instance, one team found no evidence that flowing water caused bright deposits on the planet. Instead, the scientists proposed dry landslides caused the deposits.

"All findings are good findings," said one team leader Alfred McEwen, a planetary geologist at the University of Arizona.

Philip Christensen of Arizona State University said the MRO results reiterate that "Mars has been fairly dry for the recent past and we need to be careful and not overestimate how much water may have been present, or may have shaped the surface" in ancient times.

"I have been a 'dry Mars guy' for a long time," Christensen said. "These findings are basically saying you look at very high resolution and you do see some evidence for water, there's no disputing that. But you don't see an overwhelming amount of evidence for water."

Lava explosions

The bus-sized MRO orbiting spacecraft, launched in 2005, is equipped with six instruments, including the High-Resolution Imaging Science Experiment camera, or HiRISE, which provides 10 times the resolution of any past Mars imagers. While the MRO images are in some cases inconclusive on the question of

Martian water, they are painting a picture of the Martian surface for scientists in unprecedented detail.

In some cases, the images refute past speculation that some of the features were created by flowing water.

A team led by Windy Jaeger of the U.S. Geological Survey in Arizona analyzed HiRISE images of the Athabasca Valles, a young outflow channel system speculated to have been carved out by past catastrophic floods.

"That entire surface is coated with a thin layer of solidified lava, very hard rock that's almost preserved the channel system," Jaeger said, adding: "Catastrophic water floods probably did carve the channel system, but lava flowed through it more recently."

The findings suggest that rather than flooding, steam explosions left behind trails of cone-shaped features found on the floor of Athabasca Valles.

"When water and lava interact it causes a steam explosion," Jaeger told *SPACE.com*. "And so the lava-covered ground had ground ice in it. And as that water was heated it exploded in steam explosions through the lava."

Dry landslides

McEwen led another research team, which studied a variety of landforms also thought to be associated with past water on Mars. They examined images of gully deposits that had been detected last year by the Mars Global Surveyor. The gully deposits were not present in 1999 images but appeared by 2004. The before-and-after images raised hopes that modern flows of liquid water created the deposits. However, observations from MRO suggest a dry origin, McEwen said.

Both chemical analyses and images of one of the fresh deposits showed no signs of frost or ice and no evidence for even hydrated minerals, all of which could have given the deposits a "bright" appearance.

"We think dry landsliding could've created the bright deposits," McEwen said.

The slopes above this deposit and five other locations are steep enough for sand or loose, dry dust to flow down the gullies, the scientists say. Material uphill could be the source.

In science, discrediting a theory can be just as important as supporting one. "Some science reporters are acting as if we should be disappointed these new bright deposits weren't deposited by water," McEwen said. "We're excited by any advance in understanding Mars no matter what it is."

No ocean

The researchers also ruled out a hypothesis for an ancient ocean on Mars.

The Vastitas Borealis Formation, which covers low-lying northern plains of Mars, was thought to be the result of fine-grained deposits left by an ancient ocean. The new HiRISE images reveal the area, which appeared as flat and featureless in prior missions, is peppered with large boulders.

The mixed-bag of findings intrigue scientists involved.

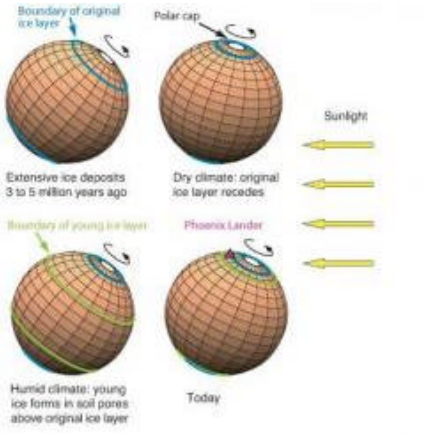
While Mars is dry now, there remains a lot of water locked up as ice at the poles and beneath the surface away from the poles.

"Ninety-nine percent of Mars is pretty dry and pretty average and not all that exciting," Christensen said. "But the one percent is extremely interesting. So imagine stumbling across an oasis or hot spring out in the middle of a desert. It's a barren desert but gosh that little oasis sure looks attractive."

As an astrobiologist, Christensen says Mars holds plenty of hideouts for life, "I think there are still plenty of places to look for life on Mars."

Mars Has Had Many, Many Ice Ages

from Nicholos Wethington



The polar ice caps on Mars have been there for a long time; although, they haven't always stayed the same size, or shape. They cover the surface between the poles and approximately 60° latitude today, but Norbert Schorghofer of the Institute for Astronomy and NASA Astrobiology Institute in Hawaii has shown that Mars has had at least forty major ice ages during the past five million years.

The Martian ice caps are divided into three layers: a massive bottom sheet, a porous middle layer and a thin, dry, dusty top layer. The makeup and extent of the ice coverage has varied over its long history due to both precipitation of water vapour from the atmosphere, and the diffusion and condensation of water from pores in the ice.

"Although neither of the two mechanisms by itself could simultaneously account for the mass fraction and latitudinal boundary of the observed ice, their combination provides just enough ice at the right places," Schorghofer said.

Unlike the Earth, Mars doesn't have a Moon to keep its tilt in check. Instead, the planet is able to tilt as much as 10-degrees from its current angle. This can create tremendous variation in the size of its ice sheets.
Earlier studies of the ice showed that the shifting of the ice was due largely to Mars' varying tilt (obliquity), and thus changes in global and local temperatures affecting the humidity levels of the entire planet. Schorghofer used computer modeling that takes into account thermal and atmospheric conditions, as well as the growth and retreat of the ice sheets. His research shows that the transfer of water vapor from the ice into the atmosphere, and the condensation of this water back into the ice profoundly altered the way in which the ice caps melted and re-froze.
Closer to the poles, the amount of ice changes very little over time. But near the edges of the sheets, the volume of ice has varied by as much as 100,000 cubic km during each ice age. Mars' icy love handles have each also shrunk an overall depth of 60cm over the past 2.5 million years.
Understanding the cause for ice ages on Mars may help us learn more about the climate history of other planets, including Earth.
"The dynamic nature of the ice sheets makes Mars an ideal system in which to test and expand our knowledge of astronomical climate forcing. A great deal could be learned about terrestrial ice ages from the study of Martian ice stratigraphy – a longer, cleaner and simpler record than Earth's," Schorghofer said.

When the Phoenix Mars Lander arrives at the Red Planet in 2008, it might just see the different kinds of ice layers that Schorghofer is predicting.

Move to new planet, says Hawking

The human race must move to a planet beyond our Solar System to protect the future of the species, physicist Professor Stephen Hawking has warned.
He told the BBC that life could be wiped out by a nuclear disaster or an asteroid hitting the planet.

But the Cambridge academic added: "Once we spread out into space and establish colonies, our future should be safe."

Prof Hawking, 64, was speaking before receiving the UK's top science award, the Royal Society's Copley Medal.

He said there were no similar planets to Earth in our Solar System so humans would "have to go to another star".

Professor Hawking said that current chemical and nuclear rockets were not adequate for taking colonists into space as they would mean a journey of 50,000 years.

He also discounted using warp drive to travel at the speed of light for taking people to a new outpost.

Instead, he favoured "matter/anti-matter annihilation" as a means of propulsion.

He explained: "When matter and anti-matter meet up, they disappear in a burst of radiation. If this was beamed out of the back of a spaceship, it could drive it forward."

Travelling at just below the speed of light, it would mean a journey of about six years to reach a new star.

"It would take a lot of energy to accelerate to near the speed of light," he told BBC Radio 4's Today.

Professor Hawking became famous with the publication of his book A Brief History of Time in the late 1980s.

'Goal is space'

The physicist was not given many years to live when he was diagnosed with motor neurone disease in the 1960s, aged 22.

He said since then he had "learned not to look too far ahead, but to concentrate on the present".

"I am not afraid of death but in no hurry to die," he said.

"My next goal is to go into space; maybe Richard Branson will help me."

Sir Richard Branson's Virgin Group has contracted a firm to design and build a passenger spaceship.

Offshoot Virgin Galactic will own and operate at least five spaceships and two mother ships, and will charge £100,000 ($190,000) to carry passengers to an altitude of about 140km on a sub-orbital space flight.

----------000000000000----------

Avogadro’s number is the number of molecules found in 2.016 grams of hydrogen gas. That number is 6.0221367 x 10 to the power of 23.

That is a very big number.

How big? That number of pence would make every man, woman and child on Earth a trillionaire.

Official Prototype of Kilogram Mysteriously Losing Weight

AFP Press – Paris

A kilogram just isn't what it used to be.

Physicist Richard Davis of the International Bureau of Weights and Measures with the reference kilogram.

The 118-year-old cylinder that is the international prototype for the metric mass, kept tightly under lock and key outside Paris, is mysteriously losing weight -- if ever so slightly. Physicist Richard Davis of the International Bureau of Weights and Measures in Sevres, southwest of Paris, says the reference kilo appears to have lost 50 micrograms compared with the average of dozens of copies.

"The mystery is that they were all made of the same material, and many were made at the same time and kept under the same conditions, and yet the masses among them are slowly drifting apart," he said. "We don't really have a good hypothesis for it."

The kilogram's uncertainty could affect even countries that don't use the metric system -- it is the ultimate weight standard for the U.S. customary system, where it equals 2.2 pounds. For scientists, the inconstant metric constant is a nuisance, threatening calculation of things like electricity generation.

"They depend on a mass measurement and it's inconvenient for them to have a definition of the kilogram which is based on some artifact," said Davis, who is American.

But don't expect the slimmed-down kilo to have any effect, other than possibly envy, on wary waistline-watchers: 50 micrograms is roughly equivalent to the weight of a fingerprint.

"For the lay person, it won't mean anything," said Davis. "The kilogram will stay the kilogram, and the weights you have in a weight set will all still be correct."

Of all the world's kilograms, only the one in Sevres really counts. It is kept in a triple-locked safe at a chateau and rarely sees the light of day -- mostly for comparison with other cylinders shipped in periodically from around the world.

"It's not clear whether the original has become lighter, or the national prototypes have become heavier," said Michael Borys, a senior researcher with Germany's national measures institute in Braunschweig. "But by definition, only the original represents exactly a kilogram."

The kilogram's fluctuation shows how technological progress is leaving science's most basic measurements in its dust. The cylinder was high-tech for its day in 1889 when cast from a platinum and iridium alloy, measuring 1.54 inches in diameter and height.

At a November meeting of scientists in Paris, an advisory panel on measurements will present possible steps toward basing the kilogram and other measures – like Kelvin for temperature, and the mole for amount – on more precise calculations. Ultimately, policy makers from around the world would have to agree to any change.

Many measurements have undergone makeovers over the years. The meter was once defined as roughly the distance between scratches on a bar, a far cry from today's high-tech standard involving the distance that light travels in a vacuum.

One of the leading alternatives for a 21st-century kilogram is a sphere made out of a Silicon-28 isotope crystal, which would involve a single type of atom and have a fixed mass.

Meteors and Meteor Showers: The Science

By Robert Roy Britt
Senior Science Writer

Imagine a baseball zipping along at 30,000 miles per hour. That's how big and fast many meteors are. And though some are bigger than baseballs, most are more like grains of sand. The larger meteors are sometimes broken bits off asteroids or other planets. The small stuff is often dust left by a passing comet.

Entry into the atmosphere

When they plow through the atmosphere, meteors are heated to more than 3000 degrees Fahrenheit, and they glow. Meteors are not heated by friction, as is commonly thought. A phenomenon called ram pressure is at work. A meteor compresses air in front of it. The air heats up, in turn heating the meteor.

The intense heat vaporizes most meteors, creating what we call shooting stars. (Most become visible at around 60 miles up.) Some large meteors splatter, causing a brighter flash called a *fireball*, and an explosion, which can often be heard up to 30 miles away. When meteors hit the ground, they're called *meteorites*. Some meteors are bits broken off asteroids, others -- mere cosmic dust -- are cast off by comets. (And one more term: A *meteoroid* is an object in space that may, if it enters our atmosphere, become a meteor.)

Meteor breakup

Whether an object breaks apart depends on its composition, speed and angle of entry. A faster meteor at an oblique angle suffers greater stress. Meteors composed of iron withstand the stress better than those made of stone. Even an iron meteor will usually break up as the atmosphere becomes denser -- around 5 to 7 miles up.

A meteor sometimes explodes above the surface, causing widespread damage from the blast and ensuing fire. This happened in 1908 over Siberia.

Impact with Earth

Extraterrestrial objects that hit the ground, their speed roughly half what it was upon entry, blast out craters 12 to 20 times their size. Craters on Earth form much as they would on the moon or any rocky planet. Smaller objects create simple, bowl-shaped craters. Larger impacts cause a rebound that creates a central peak; slipping along the rim forms terraces. The largest impacts form basins in which multiple rebounds form several inner peaks.

Typical composition

Iron meteorite	Stony meteorite	Earth's crust
Iron 91% **Nickel** 8.5% **Cobalt** 0.6% Source: Encyclopaedia Britannica	**Oxygen** 36% **Iron** 26% **Silicon** 18% **Magnesium** 14% **Aluminum** 1.5% **Nickel** 1.4% **Calcium** 1.3%	**Oxygen** 49% **Silicon** 26% **Aluminum** 7.5% **Iron** 4.7% **Calcium** 3.4% **Sodium** 2.6% **Potassium** 2.4% **Magnesium** 1.9%

History

In ancient times, objects in the night sky conjured superstition and were associated with gods and religion. But misunderstandings about meteors lasted longer than they did about most other celestial objects.

Meteorites (the pieces that make it to Earth) were long ago thought to be cast down as gifts from angels. Others thought the gods were displaying their anger. As late as the 17th century, many believed they fell from thunderstorms (they were nicknamed "thunderstones"). Many scientists were skeptical that stones could fall from the clouds *or* the heavens, and often they simply didn't believe the accounts of people who claimed to have seen such things.

In 1807, a fireball exploded over Connecticut, and several meteorites rained down. By then the first handful of asteroids had been discovered, and a new

theory emerged suggesting meteorites were broken bits off asteroids or other planets. (A theory that still holds.)

One of the most significant meteorite events in recent history destroyed hundreds of square miles of forest in Siberia on June 30, 1908. Across hundreds of miles, witnesses of the Tunguska event saw a ball of fire streak through the sky, suggesting the meteor entered the atmosphere at an oblique angle. It exploded, sending out hot winds and loud noises and shook the ground enough to break windows in nearby villages. Small particles blown into the atmosphere lit the night sky for several days. No meteorite was ever found, and for years many scientists thought the devastation was caused by a comet. Now, the prevailing theory holds that a meteor exploded just above the surface.

The largest meteorite recovered in the United States fell in a wheat field in southern Nebraska in 1948. Witnesses saw a giant fireball in the afternoon that some said was brighter than the sun. The meteorite was found buried 10 feet deep in the ground. It weighed 2,360 pounds.

The most famous meteorite crater in the United States is misnamed Meteor Crater. It's in Arizona, and it's huge. The rim rises 150 feet from the surrounding plain, and the hole is 600 feet deep and nearly a mile wide. It was the first crater that was proved to be caused by a meteorite impact, which occurred between 20,000 and 50,000 years ago.

Meteor showers

When a comet nears the sun, a trail of dust and other debris burns off and remains in solar orbit. As Earth orbits the sun, it passes through this debris field spread across its path. Small bits burn up in the atmosphere, creating meteors. Meteors come from other sources, too, but comet debris streams are the source of sometimes dramatic meteor showers.

When to watch

The part of Earth where dawn is breaking is always at the leading edge of our planet's plunge along its orbital path around the Sun. This part of the planet tends to "catch" oncoming meteors left by a comet, whereas the other side of Earth, where it is dusk or late evening, outruns the debris. For that reason, the hours between midnight and dawn are typically the best time to watch a meteor shower.

“Eh, steady on!”

from John Crowther

The Transit editor prefaced Neil Haggath’s September article “Some thoughts on Science and Religion” with a health warning.

Whilst not agreeing with much of the article I found that made me think and that can’t be bad. But the list of articles from the Editor’s past-article index was an indicator of old age, not a health warning. From the titles of almost a third of those I wrote I couldn’t remember what I had written about! So if you have a poor memory as I have don’t use a strange title and look above, I have done it again.

The Churchill dog nods to us from car back shelves giving that insurance company free advertising. On television Churchill says “yes” to the questions asked. Then a lady says “I love you”. His answer is my title for this article.

We can’t love inanimate objects be they plastic bulldogs, our latest two or four wheeler or even our telescope. Only fellow human beings and pets can be loved, everything else we like.

The Greeks have three different words for love, love of nation or community, love of friends or relations and physical love. As well as loving those special to us, we should treat others with kindness and tolerance and so Neil and his fundamentalist friend, with strongly opposing views, enjoy each other’s company. The ideal is to “love your neighbour (everyone) as yourself”. This is the nature of most religions, unfortunately on the downside religion has brought the Crusades, the Northern Ireland troubles and other conflicts. However, on the upside, religions have encouraged art, music, literature, architecture and more recently science. And every faith has its fundamentalists.

Fundamentalist believers form a very small percentage of regular worshippers and they limit their God’s activities to a few thousand years. The words “faith” and “trust” have similar meanings. So, we can trust the Theory of Evolution and religious people trust in their God.

Believing in the existence of UFO’s and false beliefs denying that men have been to the Moon or saying, without proof, that Princess Diana was murdered are conspiracy ideas and not theories. I trust that the Theory of Evolution is true as do most Christians and scientists. I see the Creation story in Genesis as a brilliant attempt by a writer thousands of years ago to explain why we as we are on this planet.

We stand on the shoulders of such people. A newer Creation myth is the children's story "The Crab who played with the sea". It is one of Rudyard Kipling's "Just So Stories" about the moon and tides.

It's interesting that Rick Fienberg in his alternative "theory" has a similar idea to that of the Ancient Egyptians where a newly created sun rises each morning.

The three main religions give thanks for each new day with morning prayers and they give abstract unmeasurable quantities great importance. So we read about love, joy, peace, compassion, thankfulness, truth and about their opposites.

Neil has difficulty with the words "Outside" and "above". These are not to be taken literally. They point towards the perfection of God. So the intricate coloured decoration of ancient gospel books such as the one made on Lindisfarne have tiny deliberate errors in them for only God is perfect (*mirrored in the deliberate mistakes introduced to hand-made Persian carpets on the same principle in Islam. Ed*)

The first Russian cosmonauts said that if God existed there would have been winged angels flying in the vacuum of space. Were they being serious or were they too literally minded?

Neil recommends Richard Dawkin's book " The God Delusion". There has been a reply written – "The Dawkin's Delusion" by the theologian Alistair McGrath. I have not yet read it as I'm currently reading Allan Chapman's "Gods in the Sky" – 328 pages. It's far superior to the Channel 4 series version. The dust cover says that Dr Chapman is an active member of the Church of England and that his book describes the extraordinary rise of science first in medieval Islam and then in Christian Europe, which exploded with new intellectual energy after AD 1100. He demolishes the popular myth that religious belief has always been an enemy of science and shows that, on the contrary, without religious awareness, science would never have come into being in the first place. So we can now have Dr Chapman as a counterweight to Prof Dawkins.

----------0000000000000----------

We have better maps of Mars than we do of our own seabeds.

Bill Bryson

For you to be here now, trillions of drifting atoms had somehow to assemble in an intricate and curiously obliging manner to create you.

Bill Bryson

SPACE50: Jodrell Bank Telescope To Become Largest Cinema Screen On The Planet

(and in the modern fashion of dumbing down everything they do so with this wonderful icon of British technology! I'm not impressed. Editor)

This October, Jodrell Bank Observatory will present a unique spectacle as the iconic Lovell radio Telescope briefly becomes the largest cinema projection screen in the world!

The event marks the golden jubilee of the Lovell radio Telescope and the dawn of the Space Age, and kicks off two weeks of celebrations called the 'First Flight Festival'. During the show, the huge dish of the Telescope will act as a giant video screen displaying images of early space exploration, astronomy, engineering, the history and future of radio astronomy and the construction of the Lovell telescope itself. These spectacular moving images will be combined with music and a specially-commissioned light and laser show. Dr Alastair Gunn, the Production Manager for the event, said, 'the overall effect should be quite breathtaking. With a screen that size, the audience will be completely immersed in sound and light. We're hoping to make the projected image at least 150 foot tall, twice the biggest IMAX screen in the world.'

The Lovell radio Telescope at Jodrell Bank became operational in October 1957 and its very first use was to track the carrier rocket that launched Sputnik 1, the world's first artificial satellite. Hence, the Telescope's golden jubilee also marks fifty years of the Space Age. Jodrell Bank was heavily involved in the early exploration of space, tracking both US and Russian space probes. In fact, the Telescope received the very first pictures transmitted from the far side of the Moon in 1959, and the first pictures from the surface of the Moon in 1966. The University of Manchester is hosting numerous events throughout 2007 to celebrate this golden jubilee. The existing 50th anniversary programme involves a series of educational and cultural events that will use the celebration as a springboard to look to the future of engineering and science in the UK.

See www.manchester.ac.uk/jodrellbank. Find out more about other events to celebrate the fiftieth anniversary of the dawn of the Space Age at www.space50.org.uk.

The scientific legacy of the Lovell Telescope is also impressive. It was crucial in the discovery of 'quasars' - the most distant and energetic objects in the Universe. In the 1970s, observations with the Telescope led to the discovery of a new class of object - known as 'gravitational lenses' - first predicted by Albert Einstein almost a century ago. The event will also celebrate the scientific achievements of the Lovell Telescope, as well as astronomy in general, with spectacular imagery of the cosmos.

The event this October, called 'SPACE50' to commemorate this important landmark in human development, marks the culmination of Jodrell Bank's jubilee celebrations. The event is produced by radio astronomers at the University of Manchester's Jodrell Bank Observatory, through funds allocated by the Royal Academy of Engineering 'Ingenious' grants programme and Swinton Group Ltd.

----------0000000000----------

A computer is like an Old Testament god, with a lot of rules and no mercy.

Joseph Campbell

Carl Sagan – Master of the Cosmos – part 1

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

from Andy Fleming

It's incredible to think that on December 20 it will be eleven years since the world lost a most remarkable astronomer, pioneer exobiologist and populariser of science - Carl Sagan.

A son of Jewish immigrants to the United States, Sagan was born in Brooklyn, New York, where he spent his childhood developing an interest in astronomy. A high achiever, he studied physics at the University of Chicago, gaining a master's degree in 1956, before being awarded a doctorate there in 1960 in astronomy and astrophysics. He then lectured at Harvard University until 1968, when a move to Cornell University in Ithaca, New York beckoned. In 1971 this became a full-time professorship that included the directorship of the Laboratory for Planetary Studies. He also took an increasing interest in pioneering exo-biology and publicising the Search for Extraterrestrial Intelligence (SETI). During this period, he also became an Associate Director of the Centre for Radio Physics and Space Research at Cornell, and later was instrumental in lecturing at Cornel in scepticism and critical thinking.

Such an academic career would have been amazing in itself, but Sagan had been heavily involved in the US space program since the 1950s – including his celebrated briefings of the Apollo astronauts before their flights to the Moon. However, of utmost interest to this most talented of scientists was planetary science and the increasing number of NASA robotic missions to neighbouring

planets in the solar system. Indeed, he was responsible for many of the biology and chemistry laboratory packs placed on these unmanned probes. He also gained worldwide attention for his idea of placing gold-anodised unalterable universal messages, onto unmanned spacecraft destined to leave our solar system. These included Pioneer 10 and 11, launched in 1972 and 1973 respectively. In the albeit slim hope of these emissaries of mankind one day millions of years from now being located by extraterrestrial intelligence, the plaques were developed further, and along with the Golden Record of sounds of the earth, were again attached to the Voyager unmanned probes launched to investigate the outer solar system in 1977.

Sagan's scientific research achievements and discoveries about other planets in our solar system, and their applicability to the Earth were immense. He was, for example pivotal to the discovery of Venus's high surface temperature of 500 degrees Celsius and its crushing atmospheric pressure, this data being gained from the planet's radio emissions. Whilst working for NASA at the Jet Propulsion Laboratory at Pasadena he was involved in the design and management of the first Mariner missions to Mars. Mariner 2 would later confirm Sagan's analysis that Venus was indeed the Earth's *Evil Twin*, and not the balmy paradise which was the conjecture of many scientists in the early 1960s. Through his studies of Venus and its runaway greenhouse effect, he identified man-made carbon dioxide emissions on the Earth as a possible cause of climate change. He was also a staunch opponent of the Cold War arms race, justifying his views by research into the effects of nuclear winter – one of the after effects of a full superpower nuclear exchange.

Sagan was the first scientist to hypothesise that Saturn's moon Titan may possess lakes and oceans of liquid methane or ethane, and that the reddish haze of this moon's atmosphere was a result of complex organic molecules. This would be confirmed after Sagan's death by the Cassini probe and associated Huygens Titan lander. He also hypothesised that Jupiter's moon Europa had a subsurface ocean of liquid water. This he thought possible, under an ice sheet in such low temperatures, because of the heat from Europa's vulcanism, resulting from the massive tidal stresses on the moon due to its close proximity to the gas giant.

His other achievements included work on the seasonal changes on the surface of Mars, including what he correctly identified as windstorms, at a time when many other scientists regarded them as vegetation. His interest in the possibility of extraterrestrial life led him into demonstrating how amino acids, the building blocks of life, can be produced by irradiating basic organic chemical compounds found in abundance in our solar system's gas giant planets and their many moons. In conjunction with this he also assisted Dr Frank Drake (who formulated the now famous *Drake Equation* complete with its now decreasing number of variables for calculating the total number of intelligent extra-terrestrials capable of interstellar radio communication in the Milky Way) in writing the Arecibo Message, beamed to interstellar space in 1974, with the aim of informing

extraterrestrials about Earth. Sagan was also a founder member of the Planetary Society, an organisation that promotes the active involvement of the worldwide public in planetary exploration and new forms of propulsion such as the *Solar Sail*.

However, above all, it is Sagan's immense legacy of science advocacy, and in particular his many ground-breaking public science education publications and documentaries that earned him worldwide public acclaim, in particular *Cosmos: A Personal Voyage*. Heavily influenced by the success of the Jacob Bronowski's BBC series *The Ascent of Man (1973)*, PBS commissioned Sagan to produce (along with collaborators Steven Soter and Ann Druyan) this epic documentary series.

(to be continued in next issue…)

Transit Tailpieces

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:
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 (seller has lots of astro bits and pieces including Mamiya and Vivitar 35mm SLR film cameras).

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

----------000000000000000----------

[Sherlock Holmes:] "My dear Watson, coming by good information is not difficult. What is far more difficult is finding it again."

Sir Arthur Conan Doyle (the prophet of Microsoft Office Suite – My Documents)