TRANSIT

The Newsletter of

Cleveland & Darlington Astronomical Society

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The Porter Newtonian Telescope on an AE equatorial mount
in the Planetarium

Editorial

March 10th 2006 Meeting :

Bob Mullen on "Radio Astronomy"

April 20th meeting :

Presidential Address by Jack Youdale.

Letters to the Editor :

Dear Editor

A reprint of a prescient letter from Michael Roe to the "Spaceflight" magazine in January 1994 on the subject of terraforming Mars.

Sir, I support Fiona Vincent's view against the terraforming of Mars or any other plane ("Spaceflight" July 1993) As an amateur astronomer and supporter of space exploration I appreciate other worlds because they are different from our own. A Solar System full of copies of the Earth would be dull indeed but I believe there is hope simply because terraforming will almost certainly never happen.

The reason for this is the human race itself. We are increasing in population quite rapidly and, more importantly, our need for resources and energy are increasing per person all the time, thereby exhausting the Earth's resources within several decades and leading towards an end of our civilization. In such a state of affairs today nobody can seriously expect Mars to be terraformed in the future.

But the advocates of terraforming tell us that rapid advances in space travel will alter such a terrible fate for humaity and allow us to continue our expanding civilization for many millennia using the resources of solar energy of our whole solar system to benefit us all. A very persuasive argument until we start looking at the real world. We have Mars Observer, a simple unmanned spacecraft losing contact just before reaching Mars and even if spacecraft do eventually successfully reach Mars again we will be very lucky to land a single person on Mars before our present civilization ends. Yet the advocates of terraforming believe we can send sufficient equipment to Mars change its climate completely. Do they realize what this means?

One more point, politicians rule our activities and few of them are interested in space flight. Yet they would need to fund projects to terraform a planet costing many billions of pounds or dollars. No, by the middle of the next century the politicians and scientists will be preoccupied frantically trying to save our ravaged world and declining civilization.

I believe that Mars is quite safe from the ambitions of the terraformers. Hopefully some exploration of other planets can be accomplished in the next50 years and future generations will able to save at least part of humanity and civilization.

Michael Roe, North Riding of Yorkshire, UK

Dear Editor,

I enjoyed Ray Worthy's poem in last month's Transit. Like him I was a child in the 1940's. During the black-out nights I wondered if the stars were the street lights of Heaven. Ray's very lively imagination saw the galaxies as "corpuscles in God's blood".

So, I'll have an imaginary try, using another article from last month's Transit "Exiles from the Milky Way". What if one of these "Outcasts" or "Intergalactic Vagabonds" has an Earthlike planet which contains intelligent life? Its inhabitants would be able to observe and perhaps explore their own planetary system but far out in intergalactic space individual stars would be difficult to study.

Would a faint supernova in their own galaxy now far distant behind them, or one belonging to a galaxy far distant in front of them, be enough to persuade them to build a Hubble-type telescope? So, this imaginary planet with no stars is more alone than a permanently cloud-covered Earth-like planet. Is it also the complete opposite to a planet in a globular cluster where the starlight may be bright enough to read by.

If the "Intergalactic Vagabond" star begins to approach another galaxy and has the chance of being captured then the astronomers on their Earth-like planet will be able to study stars for the first time in their civilization. I don't read Science Fiction. Do we have a plot for one here or has it already been written? Well it has happened on "Star Trek" with Captain Kirk.

John Crowther

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Porter Newtonian Telescope for the Society

from Jack Youdale

Recently the Society has aquired a 12" f6 Newtonian telescope that belonged to the late Tony Porter of Yarm. The telescope is fully moveable on a driven equatorial mount made by Astronomical Equipment Ltd of Luton.

I was deeply involved in the making of the telescope and made the optics in 1975. I first met Tony Porter in the early 1970's when as a young man he became interested in astronomy and in particular variable star observation.

He joined the British Astronomical Association in March 1972 and almost immediately joined the Variable Star section. At that time he made his observation of the brighter stars with binoculars. However, he shortly equipped himself with a 6" Newtonian reflector to observe and record fainter variables.

By 1974 he decided it was time to build himself an observatory at his home in Yarm and equip himself with a 12" Newtonian and I became involved in providing the telescope tube and optics. The mounting was purchased from AE Luton. It was at this period that he joined The American Association of Variable Star Observers (October 1976).

Variable star observing requires dedication and care. Above all a methodical approach to visual estimates. Tony was very interested in the nature of stars and the mechanisms which create the various types of intrinsic variables. Pulsating, Eruptive and Cataclysmic Variables got special attention. After Tony's marriage his telescope remained in the observatory in Yarm and became less used.

Sadly Tony died in 1989 and in recent times his mother, Mrs Gwen Porter suggested that the telescope should be put to use for public observing at our Planetarium. Gwen Porter suggested we should place a small plaque in memory of Tony which, I am sure, the Society will be very happy to do. All Tony's astronomical effects, observations, correspondence and magazines are also part of the Planetarium Library. Thanks are due to Mrs Porter for the telescope who for many years served as a Councillor with Stockton Borough Council.

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A Blast to Chase

EUROPEAN SOUTHERN OBSERVATORY NEWS RELEASE
Posted: February 26, 2006

Possibly similar to what our own Milky Way looks like, Messier 100 is a grand design spiral galaxy that presents an intricate structure, with a bright core and two prominent arms, showing numerous young and hot massive stars as well as extremely hot knots (HII regions). Two smaller arms are also seen starting from the inner part and reaching towards the larger spiral arms.

The galaxy, located 60 million light-years away, is slightly larger than the Milky Way, with a diameter of about 120 000 light-years.

(Note from Editor) : The Wynyard Woodland Park Observing team of Ed Restall and Alex Menarry imaged a new Supernova SN2006X on February 9, 2006, during a schools remote observing session using the Faulkes Telescope North in Hawaii. John McCue used this image and a number of follow-up images to produce a light curve of the Supernova.

SN 2006X was independently discovered early February by Japanese amateur astronomer Shoji Suzuki and Italian astronomer Marco Migliardi. Found on 4 February as the 24th supernova of the year, it had a magnitude 17, meaning it was 1000 times fainter than the

galaxy. It was soon established that this was another example of a Type-Ia supernova, observed before it reached its maximum brightness. The supernova indeed brightened up by a factor 25 in about two weeks.

Since SN 2006X became so bright and since it is located inside the very much studied Messier 100 galaxy, there is no doubt that a great wealth of information will be collected on this supernova and, possibly, on the system that exploded. As such, SN 2006X may prove an important milestone in the study of Type Ia supernovae. This is particularly important as these objects are used to measure the expansion of the universe because they all have about the same intrinsic luminosity.

This is not the first supernova ever found in Messier 100. Indeed, this is one of the most prolific galaxies as far as supernovae are concerned. Since 1900, four others have been discovered in it: SN 1901B, SN 1914A, SN 1959E, and SN 1979C. Recent observations with ESA's XMM-Newton space observatory have shown quite surprisingly that SN 1979C is still as bright in X-ray light as it was 25 years ago. In visible light, however, SN 1979C has since then faded by a factor 250. SN 1979C belongs to the class of Type II supernovae and is the result of the explosion of a star that was 18 times more massive than our Sun.

Messier 100 was the 100th entry in Charles Messier catalogue, it was discovered in 1781 by French astronomer Pierre Mechain. Located in the Coma Berenices (Berenice's Hair) constellation, slightly north of the celestial equator, it is one of the brightest members of the Virgo-Coma cluster of galaxies, about 60 million light-years away. Its visual magnitude is about 9, meaning it is about 15 times fainter than what the unaided eye can see. Messier 100 is one of the more distant galaxies where accurate measurements of Cepheid variables have been made.

Supernova SN 2006X is thought to be the result of the explosion of a small and dense star - a white dwarf - inside a binary system. As its companion was continuously spilling matter onto the white dwarf, the white dwarf reached a critical mass, leading to a fatal instability and the supernova.

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The "Equation of Time"

from Ray Worthy

Round about the time of the first onslaught of Beatle mania, I was spending a couple of years on the south coast of England in the beautiful port and holiday resort of Weymouth. I was a mature student studying to become a teacher. Previous to this , I had been in the army followed by a spell working in the Development Research Department of a Nylon Works in the north east of England. Because of this, I was no longer a callow youth and exuded a certain me asure of confidence.

I had enrolled on the Maths and Science Course and was thoroughly enjoying myself. Besides doing the normal course, I had fallen under the spell of an astronomer A.F. O'D Alexander *, who lived in Dorchester a few miles up the road. This was the era before all those wonderful pictures were returned to Earth from the NASA probes. At that time he was a leading authority on Saturn. He had written a definitive book on the telescopic appearance of the planet. The tome was about three inches thick so it must have been good. I spent a lot of time at his home, working on various projects. With the aid of a college grant, I built an eight inch altazimuth telescope in a disused woodwork shop, which amazed everyone who saw and used it. (It amazed me as well as my woodworking skills had never progressed beyond making pencil stands.). The Prof had the idea that , because, after all, I was supposed to be studying how to teach, I should take over the astronomical part of the maths syllabus, and assume the job of lecturer. I was a little taken aback because the class was mainly composed of mature students, but I accepted the challenge. One part of the syllabus which gave most trouble was the part dealing with " The Equation of Time ". Members of the class had some difficulty with this topic and I had to pay special attention to the causes of the discrepancies between the passage of the real Sun and the ideal passage of the imaginary Sun. Explaining to them when they had to add on the time interval and when they had to subtract it. However we got there in the end.

I was still a student in the college of course and had to take the same exam as my " Class".

At the end of the term , when all the marks were in, we all had to parade in the lecture room and discover the results. As I was approaching the lecture room, someone diverted me with a call to another department to see about a small matter. After attending to this, I opened the door to find a guard of honour lining up in two rows, and the prof at the far end, all applauding me as I walked between them. They were all laughing uproariously. " Congratulations Ray " he said, pinning an imaginary medal on my chest, " All your Astronomy Squad got one hundred percent in that section, " and then after a short pause, he went on, " But YOU didn't. You got the " Equation of Time" question wrong."
I had added when I should have subtracted.

Out came a bottle of wine and a box of glasses. " Just remember that bit in the finals."

PS: I could not remember all the first names of my mentor, so I sent a query to a friend (Dave Graham) . The relevant part of his answer was as follows.

In any event, in answer to your query, the gentleman in question is of course Arthur Francis O'Donel Alexander, and his book 'The Planet Saturn - A History of Observation, Theory and Discovery' was first published in 1962 by Faber & Faber. More than four decades later, it remains the definitive guide to the telescopic appearance of the Saturn system. If memory serves me correctly, he taught you at teacher training college many moons ago! He was for a while, Director of the BAA Saturn Section.

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A poetic view of the search for Extra Terrestrial Intelligence

from Diane Acker sent in by John Crowther

As our metal eyes wake
to absolute night,
where whispers fly
from the beginning of time,
we cup our ears to the heavens.
We are listening

on the volcanic rim of Flagstaff
and in the fields beyond BostoniIn a great array that blooms
like coral from the desert floor,
on high wire webs patrolled
by computer spiders in Puerto Rico.

We are listening for a sound
beyond us, beyond sound,

searching for a lighthouse
in the breakwaters of our uncertainty,
an electronic murmur,a bright and fragile – I am

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Venus and Earth, worlds apart

From Space.com

Venus is commonly known as Earth's "twin sister," but when it comes to being alike, these two are more like Arnold Schwarzenegger and Danny DeVito than Mary Kate and Ashley Olsen.

After the Sun and the Moon, Venus is the third brightest body in our sky, and because of this it received lots of attention from all the great ancient civilizations, including the Mayans, the Egyptians, and the Greeks.

As early as 1600 B.C. the Babylonians kept detailed records of its movement across the sky.

But in modern times our nearest neighbour has been somewhat neglected and only three missions have been dedicated to studying the heavily clouded planet. As a result, there is still a lot astronomers don't know about Venus. Even the things they do know fairly well, such as the contents of its atmosphere, speed of rotation, and texture of its surface, continue to raise questions.

The European Space Agency plans soon to launch the instrument-loaded Venus Express satellite, which will orbit the "evening star" for two years. Over the course of the mission the satellite will bounce radio waves off the planet's young surface, snap pictures of its swirling atmosphere, take the temperature of the clouds, and search for hints of a magnetic field.

All this data will help scientists better understand a planet that from the outside resembles an early Earth and perhaps reveal clues of the existence of life.

Trouble in the atmosphere

Clear skies, temperatures around 80 degrees Fahrenheit, and a light breeze are the recipe for a perfect day for a walk on Earth, but you'd be hard pressed to find a day like that on Venus.

First of all, there's no such thing as clear skies on Venus. The entire planet is covered by a dense layer of clouds about 40 miles thick. The atmosphere is so dense that walking on Venus' surface would be like walking under 3,000 feet of water here on Earth. You'd be crushed.

And although Venus reflects about 80 percent of the Sun's radiation – Earth soaks up more – you can forget having an 80-degree day. Venus' atmosphere is about 95 percent carbon dioxide, which traps heat from the Sun so efficiently that surface temperatures average more than 860 degrees Fahrenheit. That makes Venus hotter than Mercury, even though it's twice as far from the Sun and receives only 25 percent of the solar radiance.

You might get that light breeze, however. Winds in the upper atmosphere blow at more than 200 mph. Wind on the surface creeps just a few miles an hour. But here's the kicker: Since the air it's pushing around is so dense, a soft breeze in the face on Venus would feel like getting hit by a truck, scientists say.

Life in the sky?

While the atmosphere reflects most of the Sun's radiation, there are regions in the upper layer of clouds that absorb nearly half of the ultraviolet light aimed at the planet. These spots occur globally, showing up in one area and then another, sort of like an algae bloom in the ocean. They also appear to contain an abundance of a type of sulphur compound unlike any seen here on Earth.

Scientists haven't been able to explain what in the region is absorbing all the ultraviolet light. Some scientists think that these mysterious regions could contain photosynthetic microbial organisms, like those that live in the water droplets of clouds in Earth's atmosphere.

"They might do photosynthesis in the ultraviolet as opposed to the visual spectrum. It's a tremendous amount of energy if you can make use of it instead of being killed by it," said David Grinspoon, a planetary scientist for NASA and the Southwest Research Institute. "It's unusual, but natural selection makes the best out of adversity."

The presence of sulphur is somewhat counter intuitive to life, however, since too much of it is usually harmful to organisms. But it reacts in interesting ways in ultraviolet light, Grinspoon said, and it could be used as a sunscreen for organisms and help harness energy for metabolism.

Venus's clouds appear to have everything life needs to get started, including energy sources and a liquid medium, although it remains to be seen if the droplets are stable enough to last long enough for organisms to live and reproduce.

It's not quite as hot in the upper layer of clouds as it is on the surface, and there is even a little oxygen around, produced when ultraviolet light reacts with carbon dioxide. Although, just because on our planet many forms of life crave oxygen and can't stand excessive sulphur, that doesn't mean that's how it works other places.

"We're ignorant of life in the universe," Grinspoon told *SPACE.com*. "We only have one planet that serves as an example and in science it's not good to derive information from a sample size of one."

Lightning sparks a debate

Lightning cracks several hundred times a minute on Earth, but for as long as scientists have studied Venus they haven't been able to say definitively whether it too has lightning, and it's important for researchers to solve this mystery.

"The technical side is that lightning destroys equipment on Earth all the time. If we're going to put equipment in Venus' atmosphere or in a cloud someplace, we have to be careful of lightning," said Chris Russell, a planetary physicist at UCLA. "From a planetological sense, lightning takes the atmosphere up to higher temperatures, and then chemistry can happen that doesn't happen at other times. Maybe lightning was important in the origin of life on Earth."

There are two proven ways to detect lightning on Earth – listen to it interfere with electromagnetic radio frequencies or directly visualize it. Unfortunately, what works well here hasn't produced consistent results there.

On previous missions, scientists thought they detected the tell tale sounds of lightning on the evening side of the planet. But when Cassini-Huygens did two low orbits of Venus on its way to Saturn, the results were different.

"We saw nothing, just dead nothing," said Donald Gurnett, a physicist at the University of Iowa who helped monitor the readings from Cassini. "But when we flew by Earth, we started detecting lightning halfway out to the moon, and we're detecting it on Saturn."

It could be that the atmosphere is so thick that it hides lighting from us. But another problem could be that we're looking for the signs of lightning that goes from a cloud and strikes the ground, which may not happen on Venus because the lower atmosphere is too thick for lightning to work through.

"On Venus we could be seeing much longer bolts going horizontally or up into the ionosphere, so the basic radiation pattern might be different," said Russell.

Venus Express is outfitted with a camera that can take images in infrared and visual spectrums as well as a device called the Flux Gate Magnetometer, which searches for lightning signals 128 times per second. Two years of scouring Venus with these devices should provide a better idea of lightning's existence on the planet.

Young looks

Venus was formed about the same time as Earth, around 4.6 billion years ago, but you wouldn't know from looking at it.

"The surface of Venus looks geologically young, about 500 million years old," said Steven Hauck a planetary geologist at Case Western Reserve University. "And we know this from the apparent lack of impact craters."

The planet is essentially devoid of impact craters, suggesting that at some point there was a significant geologic event that resurfaced the entire planet. This is another debated idea, though, since the surface shows no obvious plate tectonics or seismic activity, and we also can't tell whether it is still volcanically active.

"We don't see the results of horizontal motions that are part of plate tectonics that we know on Earth," Hauck said. "And we can't distinguish if this was a long period that came to an end or a global, catastrophic resurfacing of the planet."

The planet rotates counterclockwise, opposite Earth and most other planets, and does so exceedingly slow – one day on Venus equals 243 Earth days. Scientists have speculated that a massive collision with an asteroid long ago may have reversed and slowed down Venus's spin. This event may have also set off a global volcanic reaction that led to the planet's resurfacing.

It will take Venus Express less than half a year to travel to Venus, and considering our lack of knowledge of our sister planet and the possibility that her clouds might harbor life, it seems somewhat surprising that Venus Express is only the fourth mission dedicated to studying Venus.

"We need more Venus missions to really answer the biggest mysteries about the planet," Grinspoon said. "Venus Express will be a great mission and will tell us a lot about the planet, but I think to really make the next leaps in understanding Venus we're going to have to do something more than just orbit the planet. We need to take the plunge and explore the clouds and the surface directly."

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NEW MAP OF MILKY WAY REVEALS MILLIONS OF UNSEEN OBJECTS

From NASA

Nearly 400 years after Galileo determined the wispy Milky Way actually comprises myriad individual stars, scientists using NASA's Rossi X-ray Timing Explorer have done the same for the "X-ray Milky Way."

The origin of this X-ray counterpart to the Milky Way, known to scientists as the galactic X-ray background, has been a long-standing mystery. Scientists have determined the background is not diffuse, as many have thought. Rather, it emanates from untold hundreds of millions of individual sources dominated by a type of dead star called a white dwarf, along with stars with unusually strong coronas.

If confirmed, this new finding would have a profound impact on our understanding of the history of our galaxy, from star-formation and supernova rates to stellar evolution. The result solves major theoretical problems yet points to a surprising undercounting of stellar objects, perhaps by a hundredfold.

Scientists from the Max Planck Institute for Astrophysics in Garching, Germany and the Space Research Institute of the Russian Academy of Sciences in Moscow discuss these results in two papers that will be published in future editions of Astronomy & Astrophysics.

"From an airplane you can see a diffuse glow from a city at night," said lead author Mikhail Revnivtsev of the Max Planck Institute for Astrophysics. "To simply say cities produce light is not enough. Only when you get closer do you see individual sources that make up that glow - the house lights, street lamps and automobile headlights. In this respect, we have identified the individual sources of local X-ray light. What we found will surprise many scientists."

X-rays are a high-energy light form, invisible to our eyes and far more energetic than optical light. The X-ray background is more pervasive than the optical haze called the "Milky Way," leading astronomers to think the X-ray haze is diffuse, not from point sources. Previous observations have not revealed enough X-ray sources to account for the "X-ray Milky Way." This has led to theoretical problems. If the X-ray glow were from hot and diffuse gas, it would ultimately rise and escape the confines of the galaxy. Also, all that hot gas would need to have come from millions of past star explosions called supernovae, which would imply estimates of star formation and star death were way off.

"X-ray telescopes that can resolve the emission into discrete sources looked but could not account for more than 30 percent of the emission," said Jean Swank, project scientist for the Rossi Explorer at NASA's Goddard Space Flight Center, Greenbelt, Md. "Many have

thought that the lion's share was truly diffuse, for example, from hot gas between the stars."

The new study is based on nearly 10 years of data collected by the Rossi Explorer and constitutes the most thorough map of the galaxy in X-rays. The science team concluded the Milky Way galaxy is teeming with X-ray stars, most of them not very bright, and that scientists over the years had underestimated their numbers.

Surprisingly, the regular suspects of X-ray emission, black holes and neutron stars, are not implicated here. At higher X-ray energies, the glow arises nearly entirely from sources called cataclysmic variables. A cataclysmic variable is a binary star system containing a relatively normal star and a white dwarf, which is a stellar ember of a star like the Earth's sun that has run out of fuel. On its own, a white dwarf is dim. In a binary, it can pull away matter from its companion star to heat itself in a process called accretion. The accreted gas is very hot, a source of considerable X-rays.

At lower X-ray energies, the glow is a mix of about one-third cataclysmic variables and two-thirds active stellar coronas. A corona is the outermost part of a star's atmosphere. Most of the stellar corona activity also takes place in binaries, where a nearby companion effectively stirs up the outer parts of the star. That energizes the stellar analog to solar flares, which emit X-rays. The science team said there are upwards of a million cataclysmic variables in our galaxy and close to a billion active stars. Both of these numbers reflect a major undercounting in previous estimates.
The scientists could not image individual objects. What they saw was a perfect match between X-rays and infrared light detected by NASA's Cosmic Background Explorer mission in the 1990's. This indicates X-ray emission traces the stellar mass distribution and implies that the galactic X-ray background comprises a huge number of faint discrete sources.

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The New Tourist's Guide to the Milky Way

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The Irish novelist George Moore once wrote, “a man travels the world in search of what he needs and returns home to find it.”

Astronomers sometimes follow a similar philosophy when they want to learn about our galactic home, the Milky Way.

Because Earth is located on the same plane as the Milky Way’s disk, astronomers can’t look down upon our galaxy to study it the way they can for others, like Andromeda. So

for a long time, even basic things about the Milky Way, such as its shape and size, were difficult to determine.

Time travel

Astronomers came up with a variety of ways to solve this problem. They invented tools that see in ways human eyes can't, devised clever measuring techniques, and, as Moore suggested, they "travel."

With penetrating telescopes, astronomers roam the entire universe, exploring billions of galaxies in their virtual spaceships. They take the lessons, some of them learned billions of light-years away and billions of years back in time, and apply them closer to home.

As a result, our picture of the Milky Way is constantly changing as technology improves and astronomers learn more about distant galaxies. The current picture is richer than even just a few years ago as astronomers have filled in knowledge gaps and added new details.

They've recently learned, for example, that the mysterious dark matter saturating our galaxy is actually "warm," and they verified by various indirect means the existence of a supermassive black hole at its center. Studies have also shown that the Milky Way is more massive, more crowded and its stars more lonely than previously thought.

If our virtual travelers could then now fly home, approaching the Milky Way from afar and then soar to its center, here is what they would find.

First stop: The halo

The Milky Way is a member of a collection of more than 50 galaxies called the Local Group. In terms of space occupied, Andromeda, or M31, is the biggest galaxy in this posse, but the Milky Way is the most massive.

Were an intergalactic traveler to approach the Milky Way edge-on, the first thing she would notice is a luminous halo made up of gas and stars enveloping the galaxy. The halo is about 100,000 light-years in diameter and 1,000 light-years thick.

A light-year is the distance light travels in a year, about 6 trillion miles (10 trillion km).

This halo contains some 170 orbiting star clusters and about a dozen small galaxies. The gravitational tug of the Milky Way is so great that it can sometimes tear these passing satellites apart, stripping them of gas and even stars. One star cluster, Messier 12, is thought to have been robbed of as many as a million stars in this way.

Orphan stars stripped from their parent galaxies and clusters form streamer-like "tidal tails" or else they linger in the galactic halo, where they intermingle with other lone stars. These other stars are mostly ancient, around 12 billion years old and older, and they don't rotate around the galactic center in any organized way.

Orbiting satellites can also affect the shape of the Milky Way. According to one hypothesis, the strange warp in the Milky Way's hydrogen disk is caused by the

movement of two dwarf galaxies—the Large and Small Magellanic Clouds— and their interactions with dark matter as they orbit our galaxy.

Dark matter is an unknown sort of material that has never been seen. Astronomers know it permeates or galaxy and others because the collections of stars could not hold together without some other, invisible source of gravity.

Next Stop: The spiral disk

Astronomers estimate that the Milky Way contains about 100 billion stars. Recently, however, this number was upped by about a billion after the discovery that very old, nearly invisible stars had escaped earlier detections.

Most of the Milky Way's stars are concentrated in a main disk, which lately has been described as a series of disks, none of which are entirely distinct, but instead overlap one another. The largest is known as the *thick disk*; this disk is fairly flat and spirals like a slow-spinning hurricane because of our galaxy's rotation.

Nestled within the thick disk is an even flatter disk of stars, known as the *thin disk*. The stars in this thin disk rotate even faster around the galactic center than those in the thick disk.

Further in is yet another disk, known as the *extreme disk*, where stars and clouds of gas are moving fastest of all.

Our Sun, which is 4.6 billion years old, is located 26,000 light-years away from the galactic center on one of the spiral arms. It is a location considered more suitable than others for harboring life, in part because the central region is too chaotic, and in part because the concentration of metals there is too heavy, and it's too light in the galaxy's outer fringes.

The Sun makes one complete orbit around the galaxy about once every 225 million years. In contrast, stars near the galactic center complete a lap in a few million years or less. These stars as a group tend to be younger than the galactic average, most ranging in age from 1 billion to 10 billion years old.

Getting closer: The galactic bar

A galactic traveler nearing the center of the Milky Way will feel a greater pull of gravity as the ship approaches the densest and brightest part of our galaxy, a spherical region known as the central bulge.

Things are much different here. Most of our galaxy is relatively uncrowded—the nearest star to our Sun, for example, is 4.2 light-years away. But roughly 10 million stars are known to orbit within a light-year of the galaxy's center.

Recent infrared surveys with NASA's Spitzer space telescope confirmed that the Milky Way is not a perfect spiral galaxy but instead sports a long bar of stars within the central bulge. This galactic bar is believed to be made up of about 30 million stars, stretching

27,000 light-years from end to end. It consists mainly of old, red stars, which is one reason it stands out and can be detected.

The galactic bar is thought to spin like a propeller inside the Milky Way center, helping to create our galaxy's unique spiral shape.

Observations of other galaxies also suggest that galactic bars plays an important role in feeding the colossal black holes believed to lay at the heart of many galaxies, including our own.

Destination: The black hole

The Milky Way's suspected black hole is called Sagittarius A*, or Sgr A*, and is thought to have between 3.2 and 4 million times the mass of our Sun.

Recent studies suggest that all of this mass is confined, amazingly, to an area approximately 10 times smaller than Earth's orbit around the Sun. Sgr A* is also probably rotating, making one full revolution about every 11 minutes.

Scientists haven't glimpsed Sgr A* directly but they infer its distance from the incredible speeds of the stars around it, which move 50 times faster than Earth orbits the Sun. The gravity required to keep these stars in such a fast, tight orbit is calculable, and the tiny area into which it must fit indicates that it has to be a black hole, experts say.

While most black holes form from the collapse of massive stars, colossal black holes like Sgr A* are believed to have "co-evolved," or formed along with the galaxies they inhabit.

According to this view, black holes are more than just indiscriminate and voracious gobblers of matter; they are forces of creation that help sculpt a galaxy's shape and distribute its stars.

Our intergalactic traveler's journey through the Milky Way ends here at Sgr A*. The ship must either swerve away and make for other galaxies, or risk breaching the black hole's event horizon, the theoretical boundary beyond which gravity is so strong that no form of matter or energy can escape.

More to come

There are still vital details missing in our picture of the Milky Way. Current models insist, for example, that our galaxy should have as many as a thousand dwarf galaxies buzzing around it, each with between 0.01 percent to 10 percent the mass of the Milky Way. Yet only a relative few satellite galaxies and globular clusters have been found.

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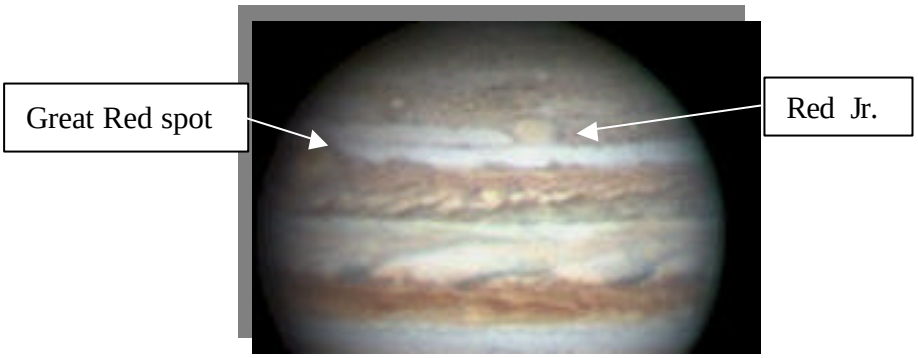
Jupiter's New Red Spot

March 3, 2006: Backyard astronomers, grab your telescopes. Jupiter is growing a new red spot.

Christopher Go of the Philippines photographed it on February 27th using an 11-inch telescope and a CCD camera:



Above: Red spots on Jupiter, photographed by amateur astronomer Christopher Go on Feb. 27, 2006.

The official name of this storm is "Oval BA," but "Red Jr." might be better. It's about half the size of the famous Great Red Spot and almost exactly the same color.

Oval BA first appeared in the year 2000 when three smaller spots collided and merged. Using Hubble and other telescopes, astronomers watched with great interest. A similar merger centuries ago may have created the original Great Red Spot, a storm twice as wide as our planet and at least 300 years old.

At first, Oval BA remained white—the same color as the storms that combined to create it. But in recent months, things began to change:

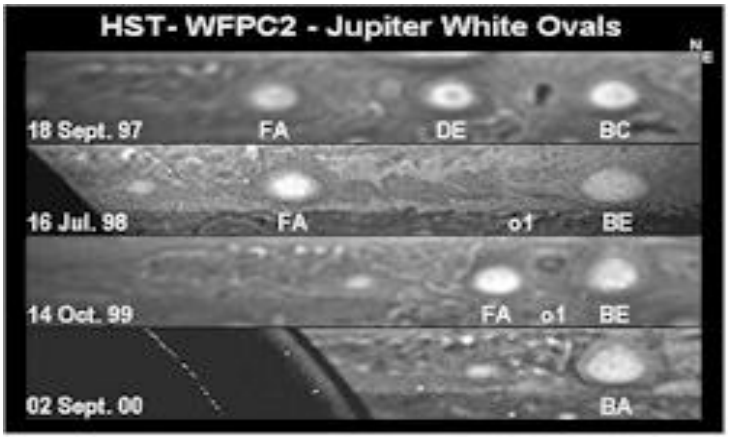
"The oval was white in November 2005, it slowly turned brown in December 2005, and red a few weeks ago," reports Go. "Now it is the same color as the Great Red Spot!"

"Wow!" says Dr. Glenn Orton, an astronomer at JPL who specializes in studies of storms on Jupiter and other giant planets. "This is convincing. We've been monitoring Jupiter for years to see if Oval BA would turn red—and it finally seems to be happening." (Red Jr? Orton prefers "the not-so-Great Red Spot.")

Why red?

Curiously, no one knows precisely why the Great Red Spot itself is red. A favorite idea is that the storm dredges material from deep beneath Jupiter's cloudtops and lifts it to high altitudes where solar ultraviolet radiation--via some unknown chemical reaction—produces the familiar brick color.

"The Great Red Spot is the most powerful storm on Jupiter, indeed, in the whole solar system," says Orton. The top of the storm rises 8 km above surrounding clouds. "It takes a powerful storm to lift material so high," he adds.



above: Hubble images detail the birth of oval BA in 1997-2000

Oval BA may have strengthened enough to do the same. Like the Great Red Spot, Red Jr. may be lifting material above the clouds where solar ultraviolet rays turn "chromophores" (color-changing compounds) red. If so, the deepening red is a sign that the storm is intensifying.

"Some of Jupiter's white ovals have appeared slightly reddish before, for example in late 1999, but not often and not for long," says Dr. John Rogers, author of the book "Jupiter: The Giant Planet," which recounts telescopic observations of Jupiter for the last 100+ years. "It will indeed be interesting to see if Oval BA becomes permanently red."

See for yourself: Jupiter is easy to find in the dawn sky. Step outside before sunrise, look south and up. Jupiter outshines everything around it. Small telescopes have no trouble making out Jupiter's cloudbelts and its four largest moons. Telescopes 10-inches or larger with CCD cameras should be able to track Red Jr. with ease.

What's next? Will Red Jr. remain red? Will it grow or subside?

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The Milky Way finally unwrapped

Written by Ima Joker, Spitzer Science Center

April 01, 2006

Spitzer Space Telescope scientists have successfully probed the center of the Milky Way® and have come to a stunning conclusion: the center is full of chocolate nougat.

"When we first launched Spitzer, we were told that the center of the Milky Way was too bright to observe," said Dr. April Phoole, an astronomer at the Spitzer Science Center. "But with persistence and hard work, we devised the observational strategy that made this discovery possible."

Thanks to the unique campaign, Phoole and her team have analyzed all the elements of the Milky Way®: milk chocolate (sugar, cocoa butter, skim milk, chocolate, lactose, milkfat, soy lecithin, artificial flavor), corn syrup, sugar, partially hydrogenated soybean oil, skim milk, less than 2% milkfat, cocoa powder processed with alkali, lactose, malted barley, wheat flour, salt, egg whites, artificial flavor, and soy protein. However, Phoole is philosophical about her discovery. "Sadly, this discovery does not help us locate the universe's 'missing' dark chocolate matter."

Spitzer has three main instruments on board: two cameras, the Infrared Array Camera (IRAC), and the Multiband Imaging Photometer for Spitzer (MIPS), and an infrared spectrograph (IRS). In the past Spitzer has been used to determine the compositions of distant galaxies, newly formed stars still embedded in clouds of dust, and debris disks where new planets may be forming.

"Next we plan to turn our attention to analyzing the small, round, multi-colored objects known to astronomers as M&M's®," Phoole concluded.

HAPPY APRIL FOOLS' DAY!

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Custom Telescopes UK.

Glen Oliver, a long-time member of the Society, can supply telescopes and accessories of all kinds. He operates from Hartlepool and has a website,
http://homepage.ntlworld.com/glen.oliver/custom.htm
e-mail glen.oliver@ntlworld.com.

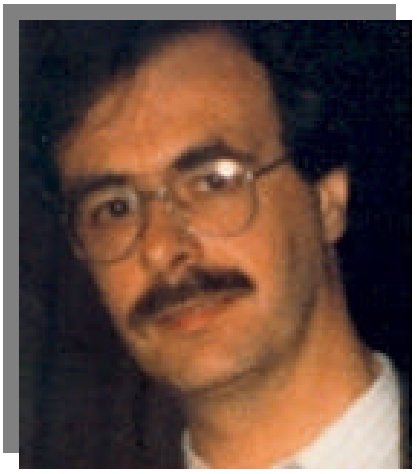
Support local businessmen! Glen tells me that he now has an Astronomy and Space books page on his website

Transit Adverts If you wish to let members know what you want to sell or what you are looking for, please send an advert for the magazine.

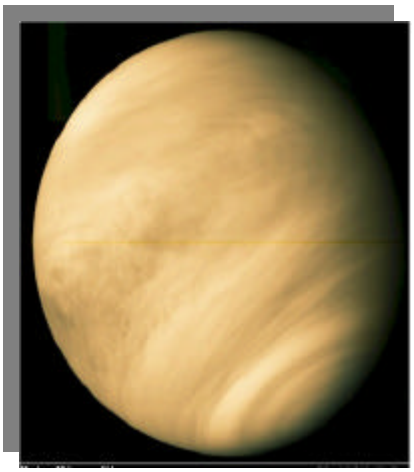
CaDAS Website Don't forget to visit our very own website at www.**wynyard-planetarium**.net.

For sale – Helios 240mm reflector with tripod, eyepieces, Barlow etc. Sensible offers considered. Please contact Graham Johnson at the Carlton Outdoor Centre on 01642 712229

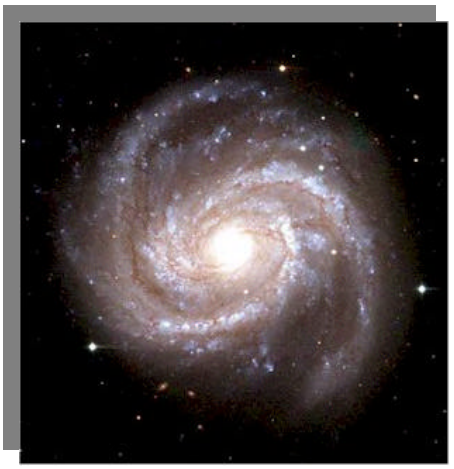
Articles Please send contributions for the newsletter to Bob Mullen, 18 Chandlers Ridge, Nunthorpe, Middlesbrough, TS7 0JL, 01642 324939 (b2mullen@hotmail.com) Copy deadline date is the 25th of each month.



Anthony K. Porter of Yarm, Variable Star Observer



Venus from Mariner 10



Spiral Galaxy M100