



The PRETORIA CENTRE

of the

Astronomical Society of Southern Africa

www.pretoria-astronomy.co.za

NEWSLETTER JULY 2011

Next meeting

Venue: The auditorium behind the main building at Christian Brothers College (CBC), Mount Edmund, Pretoria Road, Silverton, Pretoria.

Date and time: Wednesday 27 July at 19h15.

Programme:

- **Annual General Meeting:** It will be short and sweet. It will last only about 30 minutes. Come and speak your mind and listen to what others have to say.
- **What's Up:** by Percy Jacobs.
- 10 minute break — library will be open.
- **Main talk: "The use of digital photography to determine the effect of sky glow on stargazing in a natural environment" by Dawie Jansen van Vuuren.**
- Socializing over tea/coffee and biscuits.

The chairperson at the meeting will be Johan Smit.

Next observing evening: Friday 22 July at the Pretoria Centre Observatory, which is also situated at CBC. Turn left immediately after entering the main gate and follow the road. Arrive from sunset onwards.

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Last month's observing evening - by Michael Poll and Johan Smit

A nice clear evening, and not as cold as it could have been. We have had two cloud free observing evenings in a row, not to mention it being clear for the lunar eclipse, so a good run for our money! Several telescopes and 20 or so people led to a pleasant evening. Some of the people present had been at the eclipse event on June 15th, and were very welcome, and Simon and Johanna had been at an eclipse event that Michael attended.

The just-past-full moon was due up shortly after 7.00 pm, so we got on to viewing some deep sky objects early, although Saturn was an early port of call for most telescopes, including people being treated to the capabilities of Johan's new telescope "Longdrop" on the planet.

Saturn is very close to Porrima (Gamma Virginis) at present, such that that it was possible to see them both in the same low power field. Saturn was closest to Porrima in mid-June, so the gap between them can be seen to increase over the next few weeks.

We looked a run of consecutive Messier objects: M4, M5, M6 and M7. The first two are globular clusters, and the second pair are open clusters. M5 is in Serpens Caput, the other three are in Scorpius. Michael also showed some double stars – Beta, Nu, and Sigma Scorpii, and Alpha Librae (the latter of the famous name Zubenelgenubi). We also looked at was the False Comet in Scorpius (NGC 6231) and the globular cluster NGC 6641 near G Scorpii.

We checked a few of our favourite southern clusters, including IC 2602 (the Theta Carinae Cluster) and NGC 3532 (the Wishing Well Cluster), and no viewing evening is complete without Johan spending appropriate time showing NGC 2547 (the cluster with Heart) to at least a few visitors, especially on this evening, because the cluster is sinking towards the west and will soon be unfavourable to observe.

We had a good look at the moon after it came up. Not a lot of detail at the terminator, as it was still only a couple of days past full. We did pick out some of the more well know craters – Grimaldi (the darkest spot on the moon, and quite well shown as libration had carried it into view), Aristarchus (the brightest spot on the moon); Plato and Tycho. Copernicus was noted, but with the sun overhead was not easy to discern. Mare Crisium (570 km in diameter), was still in view, but about to experience sunset.

Later on, because the moon had washed out the deeper sky, there were plenty of things to talk about, although the long period variable S Carinae was located, and was noted to be at nearly its brightest. There is a neglected open cluster near this star, namely NGC 3114.

Last month's meeting – by Percy Jacobs

To our new members and visitors, we offer a warm welcome into the Pretoria ASSA Society. The meeting started with Dr Hein Stoltsz taking us through the "10 Greatest Astronomical Discoveries of 2010. Hein split the discussion into 3 parts:

- Top 10 Astronomy-Related Stories of 2010
- Top 10 Scientific Discoveries of 2010
- Ten Science Stories That Changed Our Decade

In general, biological research takes much longer to make huge strides than observational research with findings such as those offered by planetary probes, space and earth-based telescopes that offer almost immediate results and a prediction is that most of the top ten discoveries of this decade will be in the field of astronomy and astrophysics.

Top 10 Astronomy-Related Stories of 2010

- Radar Images Reveal Tons of Water likely at Lunar Poles
- Exoplanets Galore!
- The Discovery (or not) of Exoplanet Gliese 581g
- More Mysteries of Titan Revealed
- SpaceX Makes Great Strides in Commercial Space Endeavours
- Faster than Light Pulsars discovered
- Hayabusa Returns To Earth with Samples of Asteroid

Enceladus and the Tiger Stripe Jets
 Solar Dynamics Observatory gives us a New View of the Sun
 Bacteria Found that can Live on Arsenic

Top 10 Scientific Discoveries of 2010

Creation of first self-replicating synthetic life
 Scientists found life built with toxic chemical
 Antimatter made & trapped in lab for the first time
 Scientists Solve Mystery Of Mass In Variable Stars
 Astronomers Discover 'Rosetta Stone' For T-dwarf Stars
 Mysterious Giant bubbles discovered in Milky Way
 Possible Ice Volcanoes Spotted On Moon Of Saturn
 Wobble May Keep Water Liquid On Moon Of Saturn
 Planetary collisions in double star-systems leave no room for life to emerge
 Super-volcano erupts in outer galaxy, similar to Icelandic volcano on Earth

Ten Science Stories That Changed Our Decade

The LHC Comes Online
 Our Cyborg Present
 Commercial Spacecrafts Prepare to Take Flight
 Climate Change Takes Center Stage
 Stem Cells Grow Up
 Changing Your Genes (genetic engineering)
 The Book of Life Recorded (human genome)
 Shaking Up the Human Family Tree (Ardi, a fossilized hominid skeleton found in Ethiopia)
 Water, Water Everywhere (Mars / Moon)
 It's Full of Planets! (our universe)

Other discoveries

A New Element? Element 117, an extremely heavy combination of berkelium and calcium isotopes. It existed for only the tiniest fraction of a second before vanishing again.
 Scientist find an 'aging' gene

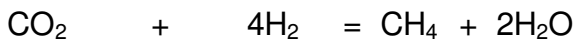
Then it was Percy Jacobs who presented What's Up for July 2011.

After that we had our main Speaker, Dr Chris Hatton, present, "Composition of the Earth and the inevitable emergence and evolution of life". To do justice to the talk, one had to attend and listen. Here I attempt the summary.

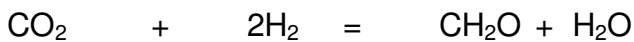
Hypothesis: constant temperature

Earliest life combined carbon dioxide and hydrogen to produce energy and biomass

Carbon dioxide + hydrogen = methane + water



Carbon dioxide + hydrogen = biomass + water



Methane warms atmosphere until haze is generated, buffering temperature at ~20°C

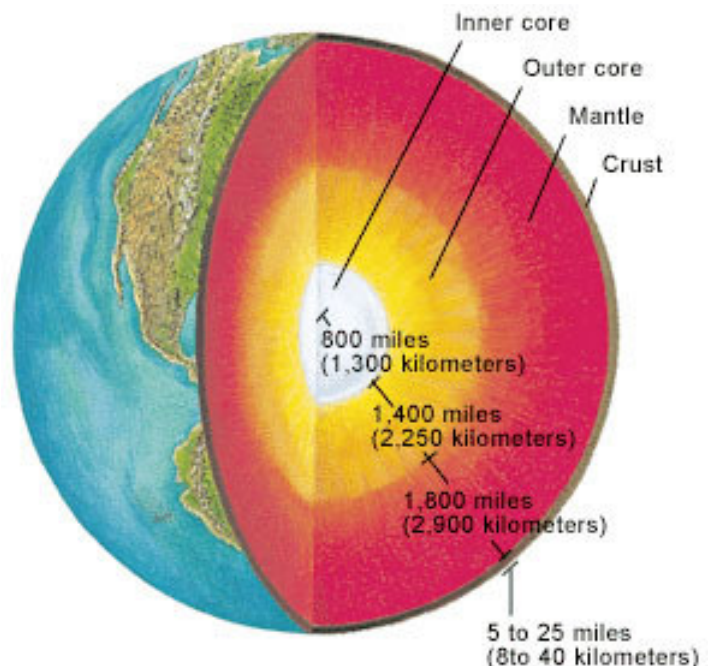


Figure right: Oxygen from the core

The core contains 2 - 5 % (by weight) oxygen

Crystallization of inner core provides 100 to 1000 times oxygen associated with ferric iron in the crust

But when did crystallization of the inner core begin?

An overview of Chris's talk

Early atmosphere contained hydrogen

First life form (protoeukaryote) combined hydrogen and carbon dioxide to generate energy (methane) and produce biomass

Archaea and Bacteria evolved to extract oxygen from hot water

Oxygen became more freely available when inner core crystallized

First eukaryote originated when an oxygen consuming bacteria united with a protoeukaryote

First plant originated when a photosynthesizing cyanobacterium united with an early eukaryote

First animal originated when an early eukaryote started to eat plants

In summary based on research

Life originated in a hydrogen rich atmosphere

Crystallisation of the inner core released oxygen, driving an increase in the size, complexity and intelligence of life as oxygen levels increased

Union of a protoeukaryotes, surviving from a hydrogen-rich world, with an oxygen-utilizing bacterium, created the first eukaryote

The carbonaceous shales of the Silverton Formation are products of this union

Release of oxygen during solidification of the inner core drives the magnetic field of the core

The potassium content of the core indicates that solidification of the inner core only began after 3.5 Ga

The lower mantle contains iron metal

Before 3.5 Ga gases reaching the surface originated in the lower mantle and were reduced (CO)

Reduced gases provide ideal conditions for the emergence of life

After 3.5 Ga oxidized gases from the core drove life and the atmosphere to more oxidized conditions (CO₂)

The appearance of life adapted to CO₂ is recorded in the Dresser Formation of Australia at 3481±4 Ma

The Komati Fm of South Africa is the same age, 3481±2 Ma

The Paleoarchean boundary should shift from 3600 Ma to 3481±2 Ma

Definitions for those that are not as intellectual as myself:

The **prokaryotes** are a group of [organisms](#) that lack a [cell nucleus](#), or any other [membrane-bound organelles](#). The organisms that have a cell nucleus are called [eukaryotes](#).

The **Archaea** are a group of [single-celled microorganisms](#). Archaea possess genes. More closely related to eukaryotes

Bacteria are a large [domain](#) of single-celled, [prokaryote microorganisms](#).

Cyanobacteria also known as blue-green algae or blue-green bacteria, is a [phylum](#) of [bacteria](#) that obtain their energy through [photosynthesis](#). The ability of cyanobacteria to perform oxygenic photosynthesis is thought to have converted the early [reducing](#) atmosphere into an oxidizing one, which [dramatically changed](#) the composition of life forms on Earth by stimulating [biodiversity](#).

Roll on summer!

The Sun reached the winter solstice (of the Southern Hemisphere (SH)) on 21 June 2011 at 19h16 South African Standard Time. The declination of the Sun then reached its maximum value, namely 23.5°. The diurnal apparent path of the Sun through the sky (because of the rotation of Earth) then took its most northerly course. Since then, this apparent path has been shifting southward ever faster. At present, it becomes ever warmer in the SH because lengthening of the day in the SH accompanies this shift and the sunlight also falls in at an ever greater angle on the sea and land surface of the SH. See the graph on page 4 of the newsletter for September 2010.

News items

- **Shattered expectations: ultra bright supernovae defy explanation.** A rare, super luminous kind of stellar explosion doesn't fit into usual supernova categories.
http://www.scientificamerican.com/article.cfm?id=superluminous-supernova&WT.mc_id=SA_CAT_SPC_20110610
- **Moons like Earth's could be more common than we thought.** About one in 10 rocky planets around stars like our Sun may host a moon proportionally as large as Earth's.
<http://www.bbc.co.uk/news/science-environment-13609153>
- **Asteroid 2011 MD.** It passed about 13 000 kilometers from Earth on 27 June 2011. Its diameter is estimated to be between 5 and 20 m. Its orbit is uncannily similar to Earth's orbit.
<http://www.skyandtelescope.com/community/skyblog/observingblog/124430479.html>
- **New supernova spotted in nearby Whirlpool galaxy.** It was discovered independently by two French backyard astronomers.
<http://newswatch.nationalgeographic.com/2011/06/03/new-supernova-spotted-in-whirlpool-galaxy/>
- **The lost galaxies.** By the latest estimate, the observable universe contains 200 billion galaxies. Astronomers wonder: Why so few?
http://www.scientificamerican.com/article.cfm?id=the-lost-galaxies&WT.mc_id=SA_CAT_SPC_20110512
- **Last Space Shuttle launched on a mission [Video].** Space Shuttle *Atlantis* was launched to the International Space Station on Friday 8 July 2011 at 17:29 SAST.
<http://multimedia.esa.int/Videos/2011/07/STS-135-Space-Shuttle-Launch/%28lang%29/en>
- **The story of the Space Shuttle [Time Line].** A visual history of the space shuttle program, spanning nearly four decades.
http://www.scientificamerican.com/article.cfm?id=space-shuttle-retirement-timeline&WT.mc_id=SA_IDR_20110708
- **NASA's spacecraft DAWN at asteroid Vesta.** The spacecraft is approaching this asteroid.
<http://www.ibtimes.com/articles/169657/20110626/dawn-spacecraft-vesta-asteroid-nasa.htm>

Southern Star Party

The Spring Southern Star Party (Spring SSP) will be held on the weekend of 21 to 23 October 2011 at Night Sky Caravan Park near Bonnievale (the same great site that was used for the previous SSP). Registration opens on July 23, and because space is very limited, it's best to book sooner rather than later.

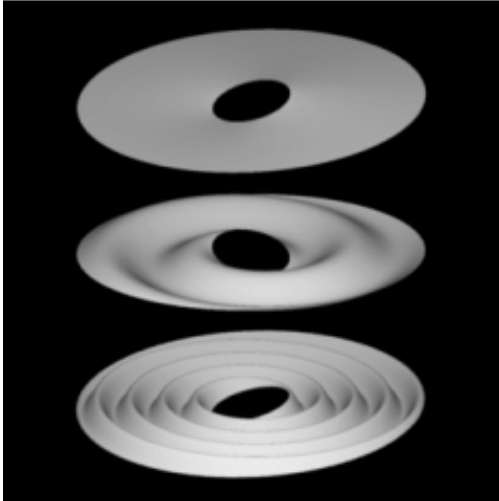
WRAC Star Party

The West Rand Astronomy Club (WRAC) will hold a star party from 29 to 31 July at the Mountain Sanctuary Park, situated near Buffelspoort dam in the Magaliesberg. It is not restricted to WRAC members. For more details, visit the WRAC website at <http://www.wrac.org.za/>. The Mountain Sanctuary Park website is at <http://www.mountain-sanctuary.co.za>

Links to stargazing & astrophotography

- **Stargazing for beginners.**
<http://www.oneminuteastronomer.com/stargazing-for-beginners-su/>
- **Astrophotography for beginners.**
<http://www.oneminuteastronomer.com/dslr-guide/>
- **Why does anyone become a star gazer?**
<http://www.oneminuteastronomer.com/4080/video-milky-way/>

A new wrinkle: comet strikes left ripples in Jupiter's and Saturn's rings



Corrugations in the giant planets' rings seem to trace back to recent comet impacts, both seen and unseen, in decades past. Something is disturbing the famed, majestic rings of Saturn as well as the lesser-known rings around Jupiter. The ring systems, which appear at first glance to be planar, wafer-thin bands of ice and dust, have on closer examination been found to be rippled, like a corrugated tin roof. The culprit in both cases appears to be comet debris strikes that tilted the rings, a tilt that over the years became twisted up into a spiral pattern of ripples within the rings.

The diagram shows from top to bottom how an initially tilted planetary ring develops into a spiral pattern of ripples.

<http://www.scientificamerican.com/article.cfm?id=ring-ripples>

The inflation debate

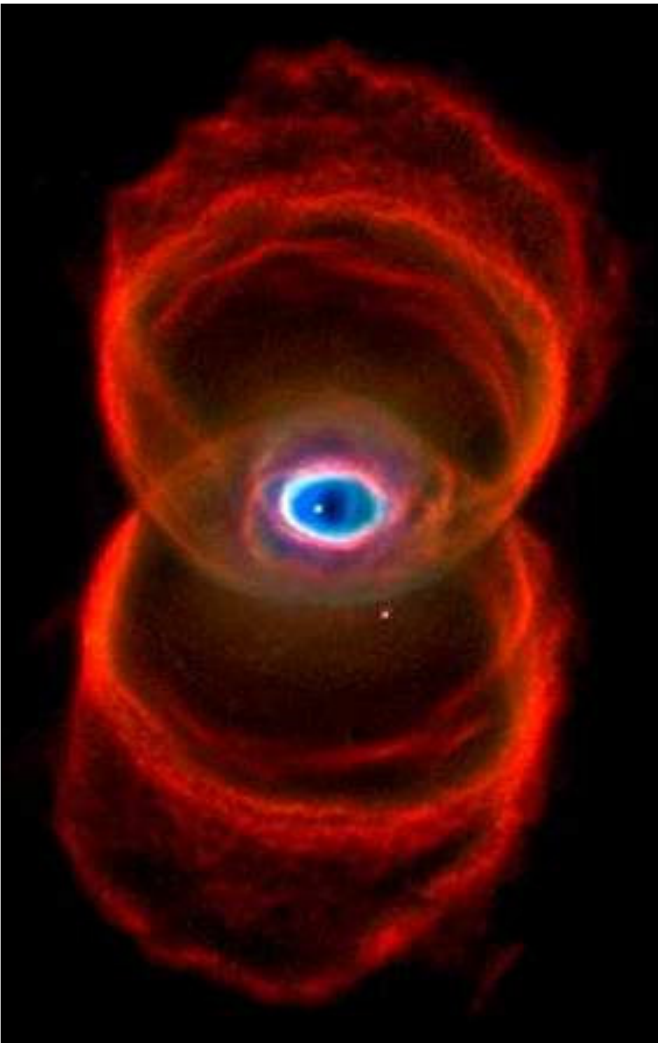
Is the theory at the heart of modern cosmology deeply flawed? The idea is that the geometry and uniformity of the cosmos were established during an intense early growth spurt. But some of the theory's creators are having second thoughts. As the original theory has developed, cracks have appeared in its logical foundations. Highly improbable conditions are required to start inflation. Worse, inflation goes on eternally, producing infinitely many outcomes, so the theory makes no firm observational predictions.

<http://www.scientificamerican.com/article.cfm?id=the-inflation-summer>

The Hourglass Nebula

The Hourglass Nebula is a young planetary nebula situated in the southern constellation Musca (The Fly) about 8000 light-years from Earth.

<http://hubblesite.org/newscenter/archive/releases/1996/07/image/a/>



Crab Nebula's gamma-ray flare mystifies astronomers

The Crab Nebula is the remnant of a supernova explosion that occurred in the year 1054 CE. It has shocked astronomers by emitting an unprecedented blast of gamma rays.

The cause of the 12 April 2011 gamma-ray flare is a total mystery. It seems to have come from a small area of the famous nebula, which is the wreckage from an exploded star.

The object has long been considered a steady source of light, but the Fermi telescope hints at greater activity. The gamma-ray emission lasted for some six days, hitting levels 30 times higher than normal and varying at times from hour to hour.

<http://www.bbc.co.uk/news/science-environment-13362958>

FEATURE OF THE MONTH: Asteroid Apophis

Asteroid Apophis will come very close to Earth in 2029 and possibly impact Earth in the year 2036. Apophis is labeled an NEO (Near Earth Object). It is approximately 270 meters in diameter and has a mass of 25 million tons. According to present knowledge of its orbit, it will come within 29 000 kilometers from Earth on Friday, April 13th, 2036. A hit from Apophis would destroy an area almost the size of France, or the entire Northeast of the USA. If it falls in the sea, it will cause a huge, destructive tsunami. Apophis was named after the Egyptian god Apep, aka "The Uncreator". <http://asteroidapophis.com/>



Editor's note: When I visited this website, the first thing I saw was an advertisement saying "Get cheaper insurance"!

Summary of "What's Up?" to be presented on 27 July - by Percy Jacobs**Moon**

First Quarter	– 6th Aug
Full Moon	– 13th Aug
Last Quarter	– 21st Aug
New Moon	– 29th Aug
Dark Sky	– 1st & last week of month (good viewing time)

Planets**Mercury** - mag. -1.2

- rises just after sunset in Leo for the first two weeks of August and then in the morning sky for an hour before sunrise in Cancer. After sunset – best month to see Mercury – west

Venus - too close to observe this month

Mars - mag. +1.2

- rises at about 04:00 in Gemini until sunrise

Jupiter - mag. -2.4

- rises just before midnight and is visible for the rest of the night in Aries

Saturn - mag. +0.9

- visible for about 4 hours after sunset in Virgo at the beginning of month, and for about 2 hours after sunset at month end

Uranus - mag.+5.8

- rises a few hrs after sunset and can be seen all night in Pisces

Neptune - mag. +7.8

- rises at sunset – visible all night in Aquarius

Events**Meteor Showers – may still see something early Aug**

Piscis Australids	– 28th July	– 5 per hr	– 21:30 to 05:00
S.Delta Aquarids	– 29th July	– 25 per hr	– 22:00 to 05:00
Alpha Capricornids	– 30th July	– 5 per hr	– 20:00 to 04:00

Comet P45 Honda Mrkos Padusakova is the brightest comet of the year. It is most easily visible from August onwards. Its closest approach to earth is 0.06AU on 16 Aug (900, 000km's).

Constellations

Scorpius, Sagittarius, Delphinus, Cygnus, Sagitta, Pavo, Lyra, Vulpecula, Aquila, Ophiuchus, Aquarius, Capricornus, Corona Australis, Lupus

“ASSA Top 100” Observers

Louis Kloke	- 3
Michael Poll	- 4
Pat Kühn	- 11
Percy Jacobs	- 9
Grant Thompson	- 13
George Dehlen	- 9
Total	- 49

Super - civilizations might live off black holes

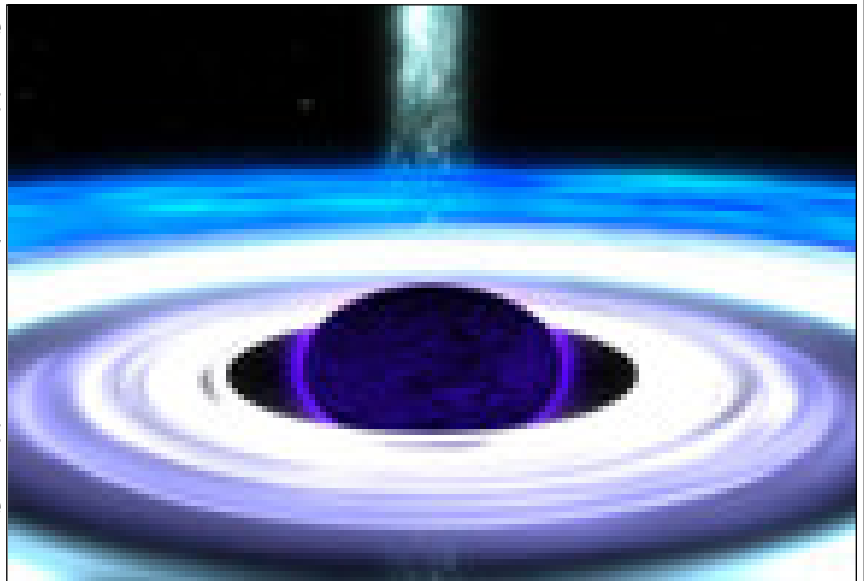
The sad unplugging of the Allen Telescope Array due to lack of funding brings a screeching halt, at least temporarily, to the most ambitious search for "hello" radio transmissions from E.T.

But perhaps it's time to simply think far outside the box regarding our preconceptions of how to find extraterrestrial civilizations, says Clement Vidal of the Evolution, Complexity and Cognition group at the Vrije Universiteit Brussel. And, the most advanced aliens may be the easiest to find.

In a recent paper, he emphasizes that we have to look at a variety of search strategies in solving the mystery of our cosmic loneliness - that is, if we are satisfied with simply finding ET and not communicating with it. Vidal's reasoning: The universe is so old there have to be far advanced civilizations out there, billions of years more evolved than us.

Above is an artist's conception of a black hole with its accretion disk and polar jets.

<http://news.discovery.com/space/super-civilizations-might-live-off-black-holes-110430.html>

**The myth of evil aliens - why Stephen Hawking is wrong about the danger of extraterrestrial intelligences**

The time is coming when we will encounter an extraterrestrial intelligence (ETI). Contact will probably come sooner rather than later because of Moore's Law, which posits a doubling of computing power every one to two years. It turns out that this exponential growth curve applies to most technologies, including the Search for Extraterrestrial Intelligence (SETI). According to astronomer and SETI founder Frank Drake, our searches today are 100 trillion (100×10^{12}) times more powerful than 50 years ago, with no end to the improvements in sight. If ETI is out there, we will make contact. What will happen when we do, and how should we respond?

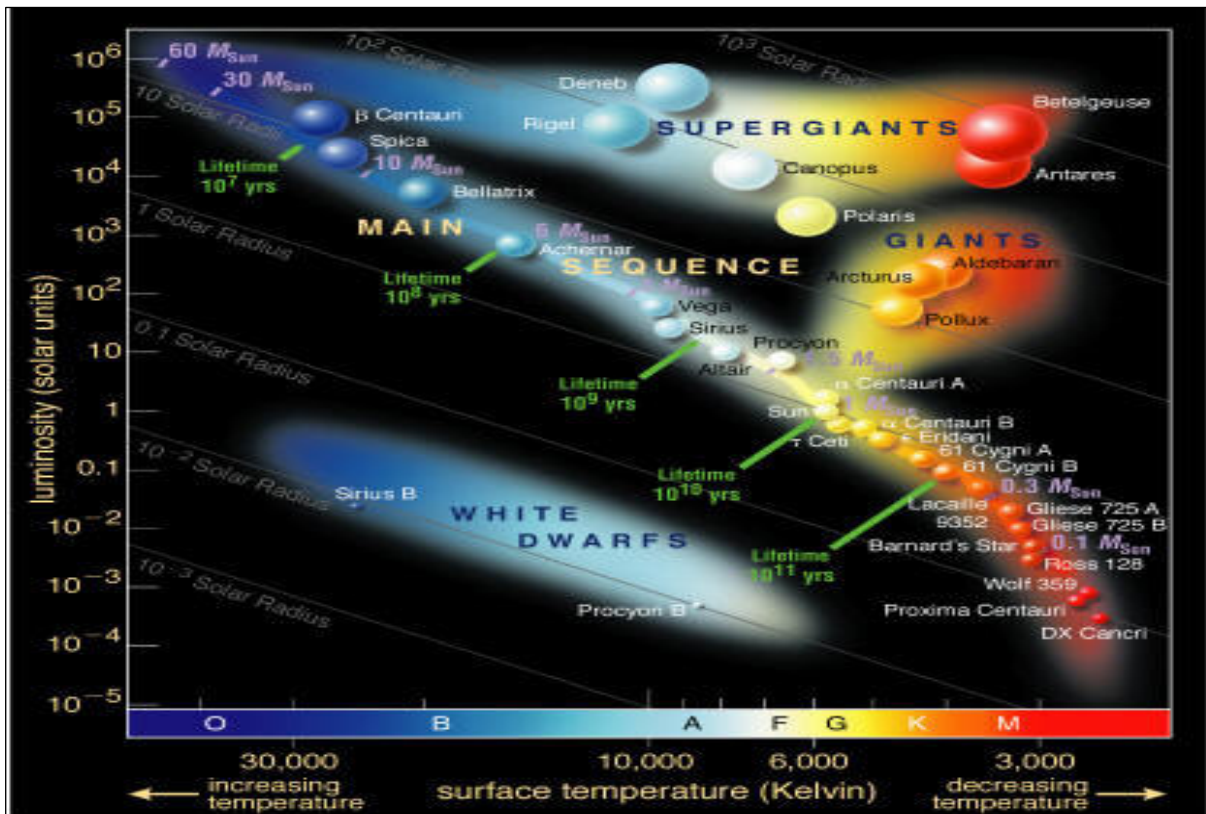
Such questions, once the province of science fiction, are now being seriously considered in the oldest and one of the most prestigious scientific journals in the world—**Philosophical Transactions of the Royal Society A**—which devoted 17 scholarly articles to “**The Detection of Extra-Terrestrial Life and the Consequences for Science and Society**” in its February 2011 issue.

http://www.scientificamerican.com/article.cfm?id=the-myth-of-evil-aliens&WT.mc_id=SA_CAT_SPC_20110519

Basics: Dwarf stars - brown, red, orange, yellow, blue, white and black: Part 1
by Hubrecht Ribbens

What are dwarf stars?

Dwarf stars are stars of average or low luminosity, mass, and size. As shown below, they are found towards the bottom half of the Hertzsprung-Russell diagram at luminosities of about 1 solar unit or less. Various subclasses can be distinguished, such as brown, red, orange, yellow, blue, white and black. Dwarf stars include so-called main-sequence stars, among which are the Sun. The colour of dwarf stars ranges over a wide visible spectrum with corresponding temperatures varying from high (above 30,000 K) to low (few thousand K) - *Encyclopaedia Britannica*.



Hertzsprung-Russel star diagram

The term **dwarf star** refers to a variety of distinct classes of [stars](#) and is very briefly summarised below. A more detailed description of each follows.

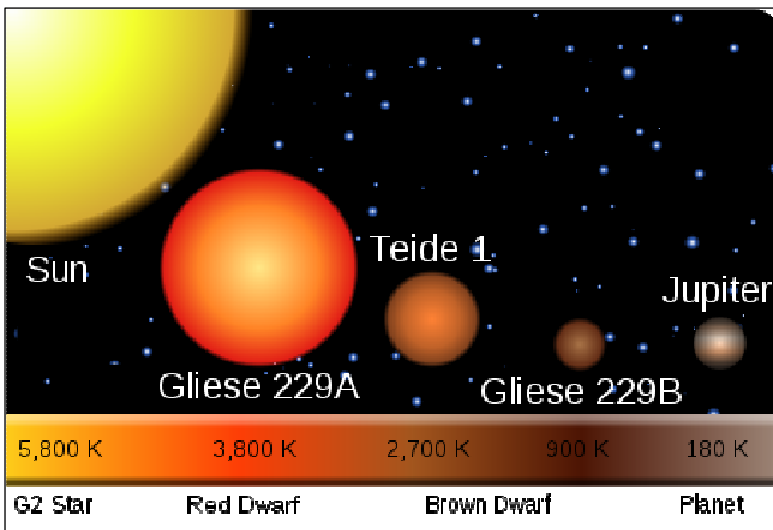
Dwarf star alone generally refers to *any* [main sequence star](#), a star of [luminosity class V](#).

- [Red dwarfs](#) are low-mass main sequence stars.
- [Yellow dwarfs](#) are main sequence (dwarf) stars with masses comparable to that of the [Sun](#). The Sun is a yellow dwarf.
- A [blue dwarf](#) is a low-mass star which is hypothesized to be the post-main sequence form of a red dwarf.
- A [white dwarf](#) is a star thought to be the final stage in the evolution of stars not massive enough to undergo a [Type II supernova](#)—stars less massive than roughly 9 [solar masses](#).
- A [black dwarf](#) is hypothesized to a white dwarf that has cooled sufficiently such that it no longer emits any visible light.
- A [brown dwarf](#) is a sub-stellar object not massive enough to ever fuse [hydrogen](#) into [helium](#)—less than about 0.08 Solar masses. (Source: Wikipedia)

Brown dwarfs

Brown dwarfs are sub-stellar objects intermediate in mass between a star and a planet. They are not really brown but a very dull red and are described as "failed stars" because they are not massive enough to have initiated hydrogen fusion in their cores. They are also commonly re-

ferred to as "missing links" between gas giants, such as Jupiter, and red dwarfs, which are the smallest, lowest-mass true stars. Based on theoretical considerations, this is believed to be between 0.075 and 0.080 solar mass, or 75 to 80 times the mass of Jupiter.



Brown dwarfs are too cool to give off much visible light but they do emit substantial amounts of infrared radiation as a result of slow gravitational contraction and small-scale deuterium fusion. They are detected by earth and space infrared telescopes. As in the case of extra solar planets, brown dwarfs can also be found if they happen to be orbiting a star; by measuring wobbles or through the radial velocity method.

While some brown dwarfs, like Gliese 229B, are part of binary systems, others having been found floating around on their own, including a number in

the Pleiades, the Sigma Orionis star cluster and the Trapezium. Some examples are:

- PPI 15, in the Pleiades, is a binary system in which *both* components are brown dwarfs.
- S Ori 47, in the Sigma Orionis cluster, holds the record for the brown dwarf with the smallest known mass – a mere 0.015 solar mass.

Some objects, such as the companion of HD 114762, lie close to the borderline between massive planets and low-mass brown dwarfs.

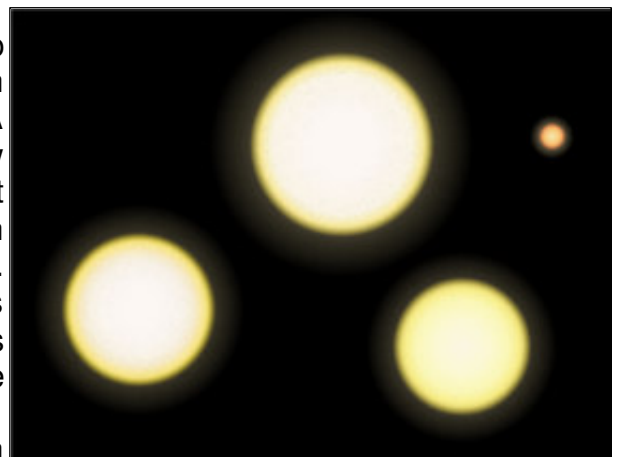
There are also many lone brown dwarfs, such as KELU-1, discovered in 1997. At a distance of only 33 light-years from the Sun, it was one of the closest brown dwarfs known at that time. Such solitary dwarfs could be *ejected stellar embryos* – small infant stars that were still accreting material when they were kicked out of the nest by more massive siblings in multiple stellar systems. On the other hand, observations of some brown dwarfs in the Orion Nebula, which show an excess of near-infrared radiation, point to the presence of dusty disks around these objects. Not only does this suggest a normal stellar formation process but also the possibility that brown dwarfs might develop planetary systems.

Red dwarfs

Red dwarfs are very low-mass stars with no more than 40% of the mass of the Sun (see illustration above comparing the size of red dwarf Gliese 229A with the Sun). Consequently they have relatively low temperatures in their cores and energy is generated at a slow rate through nuclear fusion of hydrogen into helium. Surface temperature is below 3,500 K. Thus these stars emit little light, sometimes as little as 1/10,000th that of the Sun. Even the largest red dwarfs (for example HD 179930, HIP 12961 and Lacaille 8760) have only about 10% of the Sun's luminosity.

Red dwarfs are the most common star type in the Milky Way Galaxy, at least in the neighbourhood of the Sun, accounting for over 75% of all the stars. Proxima Centauri, the nearest star to the Sun, is a red dwarf (apparent magnitude 11.05), as are twenty of the next thirty nearest stars. However, due to their low luminosity, individual red dwarfs cannot easily be observed. From Earth, none are visible to the naked eye.

This illustration shows the comparative sizes of (from left to right) the Sun, [α Centauri A](#), [α Centauri B](#), and Proxima Centauri, a red dwarf (Source Wikipedia)



Orange dwarfs

Orange dwarfs (orange to red in colour), have surface temperatures of 3,500 - 5,000 K. Their average size is about 90% that of the Sun and are 40% as luminous as the Sun. A new set of star velocity data indicates that Gliese 710, an orange dwarf, has an 86 percent chance of ploughing into the Solar System. At a time interval of about 1.5 million years from now, Gliese 710 will enter the Solar system, and will be the star whose combination of mass and close approach distance will cause the greatest predicted gravitational perturbation of the Solar system. Gliese 710 is currently located in the constellation Serpens Cauda.

<http://www.technologyreview.com/blog/arxiv/24917/>



Left: Astrophoto of Gliese 710, an orange dwarf

The flare activity of orange dwarfs are only slightly more than yellow dwarfs. Another consideration is that orange dwarfs are longer lived than our Sun – a yellow dwarf. They have almost twice the life span: almost 20 billion years compare to the 10 billion years for the Sun. Their light and heat output is much more stable than the Sun, fluctuating less over its life and thus making more of its long lifespan useful to life. Orange dwarfs may just give life more chance to originate and thrive than yellow dwarfs like our Sun. While not as common as red dwarfs (the most common star type), orange dwarfs are 3 - 4 times more common than yellow dwarfs. We definitely should not overlook orange dwarfs when searching for extraterrestrial life.

Next month: Part 2.

On our website

- Slide show of the lunar eclipse on 15 June 2011.
- Report back on the 2011 Karoo Star Party.

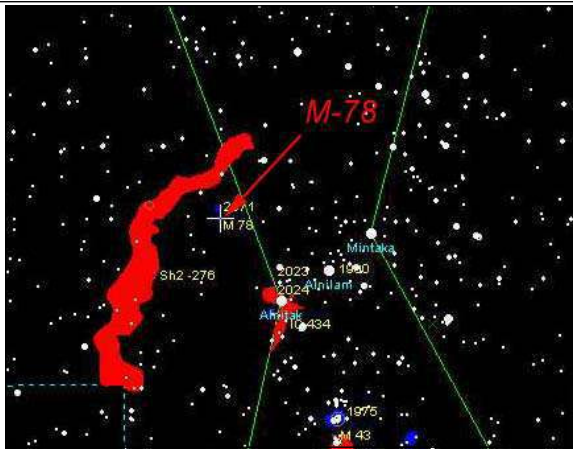
Telescope for sale

Celestron C8+ 8" Schmidt-Cassegrain.
 Celstron 25mm SMA 1-1/4" ocular.
 Celestron 6x30 Finderscope.
 Hand controller.
 Tripod.
 Custom transport container.
 Price: R5000.00 or nearest offer.
 Francois Joubert.
 083 286 4325.
joubfran@gmail.com



Telescope for sale

10 inch GSO Dobsonian telescope for sale. Hardly used. Too big to carry for the owner. Price negotiable.
 Contact:
 E Mail: ric@ricandrews.com / anandrews@deloitte.co.za
 Home Tel: +27 12 667 6864
 Cell: +27 82 823 4458 (Ric) or +27 82 553 2856 (Anneke)
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Reflected glory

Messier 78 (M78) is a fine example of a reflection nebula. The ultraviolet radiation from the stars that illuminate it is not intense enough to ionize the gas to make it glow - its dust particles simply reflect the starlight that falls on them. Despite this, **M78 can easily be observed with a small telescope**, being one of the brightest reflection nebulae in the sky. It lies about 1350 light-years away in the constellation of Orion and is about 5 light-years across.

<http://apod.nasa.gov/apod/ap080318.html>

<http://www.sciencecentric.com/news/11021706-reflected-glory.html>



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Exoplanet sky

