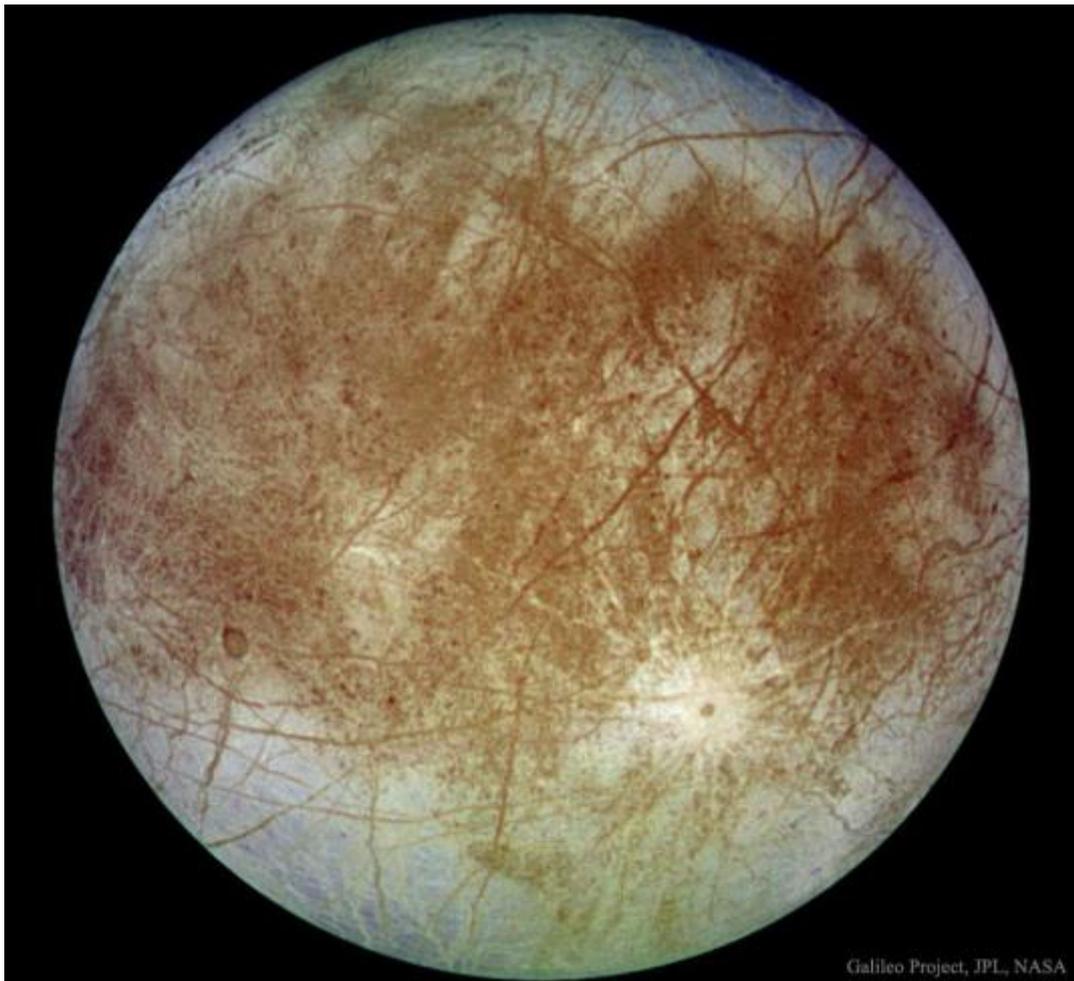




Monthly Newsletter of the Johannesburg Centre of ASSA



Jupiter's Europa from Spacecraft Galileo
Image Credit: [Galileo Project](#), [JPL](#), [NASA](#)

Canopus October 2016

Next meeting at Johannesburg Observatory, 18a Gill St, Observatory

Wednesday, October 12 2016

Speaker: TBA

Upcoming Events:

Friday 07 and 21 OCTOBER

- **Public Viewing:** Weather permitting
- **Venue:** Johannesburg Observatory, 18a Gill St, Observatory
- **Time: 19h00 - 22h30**
- **Binocular observing is encouraged. Please bring your pair.**

Contact :

Jerome Jooste (072 985 8764)

Chris Curry (082 494 4659)

Gary Els (082 389 2250)

Notifications are posted on Facebook (<https://www.facebook.com/assajhb>), assajhb@yahoo.com and Twitter @JoosteJerome on the viewing day.

Our next monthly Braai and Sky takes place on:

- **Date:** Sunday 30 October 2016
- **Time:** 16h30
- **Location:** Jhb. Observatory, Top of the hill at the Herbert Baker Library. [Map.](#)
- **Topic:** Whats Up – a detailed overview of some objects.
- **Donation:** R20 pp for the fire wood. Children under 15 free.

Canopus October 2016

*Astronomy • Stargazing • Photography • Telescopes • Talks • Demos
Interested? Visit the astronomy event of the year*



Annual Telescope & Astronomy Expo

Commercial and Amateur-built telescopes on show. Astrophotography competition. International speakers.
Science shows. Camera Obscura. **Great prizes to be won.** Maker projects. Something for young and old.

Star Party from 6pm: tour the night sky through a telescope - bring a picnic and **enjoy with friends!**

15 October 2016 - 9am to 9pm

Military History Museum – Johannesburg

www.scopex.co.za



NPO 171-291

A Visitor To ASSA Johannesburg From The UK:

Bob Argyle has been observing visual double stars for 50 years. He is Director of the Webb Society Double Star Section and edited 'Observing and Measuring Visual Double Stars', a second edition of which was published by Springer in 2012. He has visited Johannesburg on five occasions to use the Innes Telescope for micrometre measurements of visual binaries.

Bob arrived at the end of August to use the Innes telescope, as he does every few years. Over this time, and showing great dedication and interest in his chosen subject, he managed to obtain over 600 measurements of the distance between double stars working every night from the time he arrived until the 13th. of September.

Canopus October 2016

As he returns to the UK we hope to be hearing more about his work on double stars in both hemispheres.

Not to be confused with Binary star. For other uses, see Double star (disambiguation).

In observational astronomy, a **double star** is a pair of stars that appear close to each other in the sky as seen from Earth when viewed through an optical telescope.

This can happen either because the pair forms a binary star, i.e. a binary system of stars in mutual orbit, gravitationally bound to each other, or because it is an *optical double*, a chance alignment of two stars in the sky that lie at different distances. Binary stars are important to stellar astronomers as knowledge of their motions allows direct calculation of stellar mass and other stellar parameters.

Since the beginning of the 1780s, both professional and amateur double star observers have telescopically measured the distances and angles between double stars to determine the relative motions of the pairs. If the relative motion of a pair determines a curved arc of an orbit, or if the relative motion is small compared to the common proper motion of both stars, it may be concluded that the pair is in mutual orbit as a binary star. Otherwise, the pair is optical. Multiple stars are also studied in this way, although the dynamics of multiple stellar systems are more complex than those of binary stars.

There are three types of paired stars:

- **Optical Doubles** are unrelated stars that appear close together through chance alignment with Earth.
- **Visual Doubles** are stars whose binary status was deduced through more esoteric means, such as occultation (eclipsing binaries), spectroscopy (spectroscopic binaries), or anomalies in proper motion (astrometric binaries).
- **Visual Binaries** are gravitationally-bound stars that are separately visible with a telescope.

Conceptually, there is no difference between the two *visual* categories, and improvements in telescopes can shift previously double stars into visual binaries, as happened with Polaris in 2006! Thus it is only the inability to telescopically observe or detect orbital motion in the visual double stars that differentiates these two group

https://en.wikipedia.org/wiki/Double_star

Canopus October 2016

Our own Dave Blane also studies double stars and gives us a write up about the double star of the month, every month. Thank you Dave your work is appreciated. Keep reading about these and have a look at them through your telescope when you are out in the field.

October Double Star of the Month – beta Tucanae:

by Dave Blane

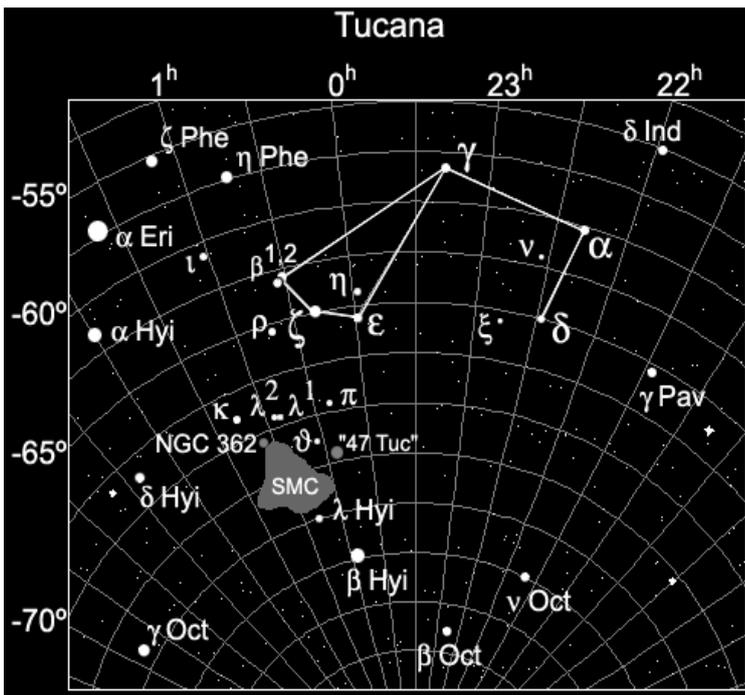
β Tucanae (031 32.56 -62 57 29.1) The two brightest components of β Tucanae are currently about 27 arc seconds apart and in the WDS catalogue this pair has the designation LCL 119. At magnitudes 4.33 and 4.53 they form one of the most splendid double stars visible to binoculars or telescopes in the sky. Although the corresponding Hipparcos parallaxes are 23.95 and 18.35 mas the formal error on the latter star is 3.34 mas so it might be argued that the stars are a physical system. Certainly the proper motions are similar and large enough, that taken in conjunction with the small change in relative position since 1826, the two stars are moving through space together. This proper motion is shared by a third star of mag 5.1 (β^3) some 5 arc minutes away so that to the small telescope user, this is a beautiful triple system.

In 2009 the writer measured the position angle and separation to be 169 deg and 26.7 arcsec.

But, bring a powerful telescope, such as the 26.5-inch refractor at the observatory in Johannesburg to bear on the group, as W. H. van den Bos did in 1925, and further stars appear. Robert Innes, using the same telescope which now bears his name, had already found that β^2 was a very close and unequal double star which turns out to be a binary of period 44.7 years. The current separation is 0.40 arc second and closing. van den Bos added companions to both β^1 and β^3 , now B 7 and B 8 in the WDS. The companion of B 7, some 10 magnitudes fainter than the primary at a distance of only 2 arc seconds must be a formidably difficult star to see. B 8 is pair of 6th magnitude stars separated by little more than 0.1 arc second. Little is known about this latter pair - it has not been measured since 1964.

The pair may be found 10 deg. north of the famous globular cluster, 47 Tucanae, and is easy to spot with binoculars or a small telescope.

Canopus October 2016



Water, Water, Everywhere:

Reading the latest news from NASA, scientists have found evidence of water, thousands of litres hidden under the surface of Pluto.

After the New Horizon spacecraft flew past Pluto last year, it was suspected that Pluto had a subsurface ocean.

Recently after analysing images received from NASA Spaceship, scientists are even more convinced that a very large ocean does exist.

Mr Brandon Johnson, an assistant professor at Brown's University's Department of Earth, Environmental and Planetary sciences led a team that focussed their research on the Sputnik Planum, a 900 kilometre area of the western lobe of Pluto's famous heart caused by a giant meteor crashing into Pluto creating an impact crater, which according to Mr. Johnson results in a negative mass anomaly but, the team of scientists found this was not the case. The crater is found to have a positive mass anomaly. They believe the result of the asteroid hitting the Planum caused a subsurface ocean to even out across Pluto.

The team of scientists concluded that the production of a positive mass anomaly is sensitive to:

- 1) How thick the ocean layer is.
- 2) How salty the ocean is because salt affects the density of water.

Canopus October 2016

Mr. Johnson says: "What this tells us is that if Sputnik Planum is indeed a positive mass anomaly- and it appears as though it is – this ocean layer of at least 100 kilometres has to be there."

Read more: <http://www.hngn.com/articles/208427/20160927/half-pluto-heart-contains-liquid-water-nasa-finds-miracle.htm>



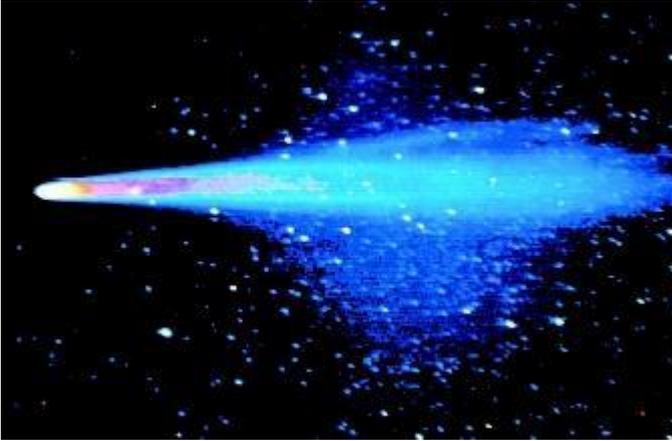
IN SPACE - JULY 14: In this handout provided by the National Aeronautics and Space Administration (NASA), Pluto nearly fills the frame in this image from the Long Range Reconnaissance Imager (LORRI) aboard NASA's New Horizons spacecraft, taken on July 13, 2015, when the spacecraft was 476,000 miles (768,000 kilometers) from the surface. This is the last and most detailed image sent to Earth before the spacecraft's closest approach to Pluto. New Horizons spacecraft is nearing its July 14 fly-by when it will close to a distance of about 7,800 miles (12,500 kilometers). The 1,050-pound piano sized probe, which was launched January 19, 2006 aboard an Atlas V rocket from

Cape Canaveral, Florida, is traveling 30,800 mph as it approaches. (Photo: NASA/APL/SwRI via Getty Images)

Water, Meteorites and Comets:

An understanding of the earliest composition of the solar system is derived from analyses of the Sun, comets, and the little-altered carbonaceous chondrites. Most of these measurements have come from analysing the spectra of light that originates from the Sun or that is reflected by bodies such as comets and asteroids, the presumed source of most meteorites. Many chemical analyses of meteorites have been made in laboratories on Earth and, increasingly, from spacecraft that encounter comets, asteroids, and the Sun's atmosphere.

Canopus October 2016



Comets comprise a huge reservoir of water in Earth's solar system. Shown here is Halley's Comet, which crossed Earth's orbit in 1986 but was barely visible to the naked eye in much of the world.

Solar Components of Water:

Because the great mass of matter in the solar system (nearly 99.9 percent) resides in the Sun, solar hydrogen (H), oxygen (O), and the water molecule (H_2O) must be considered when discussing **extraterrestrial** water.

The Sun, with an average surface temperature of about 6,000 kelvin (approximately 5,727°C or 10,340°F), would seem to be a poor place to look for water. However, scientists know that the constituents of water are enormously abundant in the Sun: hydrogen is its most abundant component, and oxygen also is a major component. Although tiny in amount, traces of the water molecule have been reported in cooler parts of the Sun's atmosphere.

Comets:

Earth's solar system is believed to be about 4.6 billion years old, based in part on the age-dating of many **chondrites**. The Sun is slightly older. Comets, consisting of ice and grains of minerals and rocks—the "dirty snowballs" of astronomer Fred Whipple—are thought to be the oldest, least altered of any of the components of the solar system. They contain mainly water ice, but other icy components have been measured as well, such as carbon monoxide, carbon dioxide, sulphur, hydrogen sulphide, methane, and hydrogen cyanide. (The term "water ice" is not redundant because in space, some gases can change to ice on the surface of planetary bodies.) Comets may have rocky cores as well as interspersed grains of material. The interspersed granular character extends to comet tails, which form by **ablation** as comets approach the Sun and the ice heats up.

These materials are minor components, however, compared to water ice. Comets thus account for a very significant fraction of water in the solar system: although small, there are many of them. The **Oort Cloud** of comets and the more recently described **Kuiper Belt** of comets account for untold numbers of comets and therefore comprise a huge reservoir of water. Many planetary scientists believe

Canopus October 2016

that cometary impacts early in Earth's history could have supplied much of the water for its oceans.

Meteorites:

Though small in amount compared to cometary water, meteoritic and asteroidal water is important in understanding water-rich Earth. Earth accumulated early in the history of the solar system by the sweeping up and accumulating of enormous amounts of debris as the early Earth orbited the Sun. These materials contributed their contained water to the growing Earth.

As Earth grew, it evolved into a core, an intermediate **mantle**, and an external crust. Water played a critical part, especially through the process of melting of the mantle and crust, with resulting **volcanism** and other **igneous** activity. Owing to volcanism, water and other **volatile** components were expelled to the surface, forming, along with possibly significant additions of cometary water, Earth's **hydrosphere**.

Meteorites fall to Earth continuously and are studied intensively for the information they provide about the earliest solar system and Earth. Until the return of rocks from the Moon, meteorites were the only known samples of extraterrestrial materials. Most meteorites are believed to come from the **asteroid belt**, which contains numerous rocky objects that orbit the Sun, mainly between the orbits of Mars and Jupiter. Some asteroids may have originated as comets, with icy exteriors that were vaporized by the Sun, leaving the rocky core.

Meteorites and asteroids have been extensively studied for their chemical composition, including water. Carbonaceous chondrites, which are the most fundamental and least modified type of meteorites, and are chemically most like the composition of the Sun, have several percent of water, primarily chemically combined in their mineral structures. The amount of contained water may decrease or increase as meteorites are altered, such as through **metamorphism**, melting, or **weathering** or impacts.

SEE ALSO; MARS, WATER ON; SOLAR SYSTEM, WATER IN THE; VOLCANOES AND WATER. ASTROBIOLOGY: WATER AND THE POTENTIAL FOR EXTRATERRESTRIAL LIFE; EARTH: THE WATER PLANET; EARTH'S INTERIOR, WATER IN THE

E. Julius Dasch

Bibliography

Chaisson, Eric J. *Astronomy*. 2nd ed. Upper Saddle River, NJ: Prentice Hall, 1997.

Life's Two Requirements:

Where water is found on Earth, life is also found, even in the most extreme physical and chemical environments. Although there is no direct evidence that life was transported to Earth by way of comets or meteorites, cometary and meteoritic transport certainly delivered the components required for the development of life: water and organic (carbon-containing) compounds.

The most common surficial features of most planets and moons are impact craters, so water and organic compounds also have been transported to all other solar system bodies via the impacts of comets and asteroids. Where heat or other sources of energy exist, along with water and organic compounds, the potential for the development of life is high.

[Http://www.waterencyclopedia.com/Ce-Cr/Comets-and-Meteorites-Water-in.html](http://www.waterencyclopedia.com/Ce-Cr/Comets-and-Meteorites-Water-in.html)

Read more: <http://www.waterencyclopedia.com/Ce-Cr/Comets-and-Meteorites-Water-in.html#ixzz4LoVnZdU>

This star was so massive it ate itself before it could go supernova:

Some massive stars end, not with a bang but a whimper.

By [Eugene Myers](#) | Published: Tuesday, September 27, 2016

X-ray: NASA/CXC/MSSL/R.Soria et al, Optical: AURA/Gemini OBs



A team of scientists may have confirmed the first failed supernova — and in the process witnessed the birth of a black hole.

Caltech astronomer Scott Adams and his colleagues Christopher Kochanek, Jill Gerke, and Krzysztof Stanek of Ohio State University, and Xinyu Dai of the University of Oklahoma, devised a novel observation technique that uses the Large Binocular Telescope (LBT) to identify candidates for failed supernovae, that is, massive stars that have died without the typical spectacular

Canopus October 2016

explosion. Using the first four years of data from the LBT survey, the team zeroed in on a star in the NGC 6946 galaxy.

This star, N6946-BH1, caught their attention because in 2009 it flared up to more than one million times the brightness of the Sun, then gradually faded — and vanished. But not without leaving a tantalizing clue to what happened: a faint trace of near-infrared radiation (IR) that is consistent with energy emitted from matter as it spirals into a black hole.

“If this event really was a failed supernova, it means that we have observed the birth of a new black hole for the first time, which is really quite exciting,” says Adams. “But this finding also has wider implications.”

Since 2003, many astronomers have accepted the idea that some stars are too massive to go supernova. Because they can't overcome their own gravity enough to explode, these stars simply extinguish and collapse into black holes. But there hasn't been any direct evidence that it happens — until now.

Adams and his team reasoned that if failed supernovae occur in some red supergiants, the largest stars in the universe by volume, the process would produce a visible burst of gravitational energy — like the bright flash of light that the Hubble Space Telescope (HST) recorded in N6946-BH1 from March to May 2009. They submitted this finding to the Monthly Notices of the Royal Astronomical Society and published a preprint online early this month.

“It implies that failed supernovae are the solution to the mystery of why higher-mass red supergiants have not been seen as supernova progenitors, and why there is a gap between the mass distributions of neutron stars and black holes,” says Adams.

There are several other possible, but unlikely, explanations for what they've observed in N6946-BH1. Analysis of new and archival photometry data from HST and the Spitzer Space Telescope allows the team to all but rule out the possibility that the star is hidden behind a mask of ejected dust. They are waiting for more data from the orbiting Chandra X-ray Observatory. X-ray emissions at the star would confirm the presence of a black hole; however, if X-rays are not detected, the team will continue to monitor it and employ a more powerful telescope to be certain the star has vanished.

“This unique survey is still ongoing,” says Adams of his team's work with the LBT. “In an upcoming paper we will present the results of the first seven years of the survey and our constraint on the fraction of core-collapses of massive stars that result in failed supernovae

http://www.astronomy.com/news/2016/09/this-star-was-so-massive-it-ate-itself-before-it-could-go-supernova?utm_source=SilverpopMailing&utm_medium=email&utm_campaign=News0_ASY_160930_00

Canopus October 2016

0000_Final%20remainder&utm_content=&spMailingID=26669865&spUserID=MTY0MDkwNTM4OTg2S0&spJobID=900041230&spReportId=OTAwMDQxMjMwS0

Comets and Meteorites during October:

Meteors – a word derived from the Greek word meteors, meaning “high in the air”.

Meteors are really bits of space rubble barging into Earth's upper atmosphere at altitudes of about 100 to 120 km.

The Orionids will be visible from 2 October peaking around 20 October and visible until about 7 November. The best viewing time will be right before dusk and just after midnight.

The Orionids are called just that because they seem to originate in the constellation Orion.

The Orionids as well as the eta Aquarids are meteor showers which were created by debris after Halley's Comet passed Earth. The Orionids are seen in October while the Eta Aquarids peak in about May.

The Draconids originating in the constellation Draco the Dragon is the only other comet to grace our skies in October. The Draconids were created when Earth passed through dust debris left by comet 21 P/Giacobini-Zinner. This comet takes about 6.6 years to make a single revolution around the Sun.

For the latest on meteorites read.....<http://lunarmeteoritehunters.blogspot.co.za/>

For more read.....<https://www.timeanddate.com/astronomy/meteor-shower/orionid.html>

Meteoroid

- A meteoroid is a small rock or particle of debris in our solar system. They range in size from dust to around 10 metres in diameter (larger objects are usually referred to as asteroids).

Meteor

Canopus October 2016

- A meteoroid that burns up as it passes through the Earth's atmosphere is known as a meteor. If you've ever looked up at the sky at night and seen a streak of light or 'shooting star' what you are actually seeing is a meteor.

Meteorite

- A meteoroid that survives falling through the Earth's atmosphere and colliding with the Earth's surface is known as a meteorite.

<http://www.sciencekids.co.nz/sciencefacts/space/cometasteroidmeteoroiddifferences.html>

Whats Up In October:

World Space Week is an international celebration of science and technology, and their contribution to the betterment of the human condition. The United Nations General Assembly declared in 1999 that **World Space Week** will be held each year from October 4-10.

What are the goals of World Space Week?

Provide unique leverage in space outreach and education. Educate people around the world about the benefits that they receive from space. Encourage greater use of space for sustainable economic development. Demonstrate public support for space programs. Excite young people about science, technology, engineering, and math. Foster international cooperation in space outreach and education

Space Week Theme: "Remote sensing: Enabling Our Future".

InOMN : International Observe the Moon Night:

This is the month of the world-wide celebration of our nearest Solar System Neighbour – the Moon!

Canopus October 2016

Mother Earth only has one Moon and it is the only one in the Solar system called Moon. The Earth and moon are very precious to us. Without our Earth, life would not be here and without the moon's gravitational influence our ocean tides, body tides and the slight lengthening of the day would not be the same.

Some Deep Sky Viewing:

The Large Magellanic Cloud
The Small Magellanic Cloud
Toucan in the Constellation Tucana
The triangulum Galaxy in Constellation Triangulum Australis
The Sculptor Galaxy in Constellation Sculptor
The Tarantular Nebular in Constellation Dorado.
The Saturn Nebula in Constellation Aquarius.
The Helix in Constellation Aquarius
NGC 6744 in Constellation Pavo.

This is a short list of objects one can view during the month of October. Using an app. On ones cellular phone will give one access to many many more deep sky objects to observe.



Peering deep into the core of the Crab Nebula, this close-up image reveals the beating heart of one of the most historic and intensively studied remnants of a supernova, an exploding star. The inner region sends out clock-like pulses of radiation and tsunamis of charged particles embedded in magnetic fields.

The neutron star at the very center of the Crab Nebula has about the same mass as the sun but compressed into an incredibly dense sphere that is only a few miles across. Spinning 30 times a second, the neutron star shoots out detectable beams of energy that make it look like it's pulsating.

By courtesy of Hubble

The NASA Hubble Space Telescope snapshot is centered on the region around the neutron star (the rightmost of the two bright stars near the center of this image) and the expanding, tattered, filamentary debris surrounding it. Hubble's sharp view

Canopus October 2016

captures the intricate details of glowing gas, shown in red, that forms a swirling medley of cavities and filaments. Inside this shell is a ghostly blue glow that is radiation given off by electrons spiraling at nearly the speed of light in the powerful magnetic field around the crushed stellar core.

The Sun in October:

Date	Sunrise	Sunset	Length of day
1/10/2016	5:47	18:08	13:23
5/10/2016	5:43	18:09	13:24
15/10/2016	5:33	18:14	13:41
20/10/2016	5:28	18:17	13:52
25/10/2016	5:24	18:20	13:56

The Moon in October:

Date	Moonrise		Moonset		Heading	
Oct	Moonrise	Moonset	Moonrise	Time	Distance (km)	Illumination
1	06:05 ↑ (92°)	18:37 ↑ (266°)	-	12:19 (66.2°)	402,526	0.2%
2	06:40 ↑ (96°)	19:28 ↑ (262°)	-	13:02 (70.1°)	404,441	2.0%
3	07:16 ↑ (100°)	20:18 ↑ (258°)	-	13:45 (73.6°)	405,683	5.7%
4	07:53 ↑ (104°)	21:09 ↑ (255°)	-	14:29 (76.7°)	406,094	11.0%
5	08:32 ↑ (107°)	22:00 ↑ (252°)	-	15:15 (79.2°)	405,518	17.8%
6	09:14 ↑ (109°)	22:50 ↑ (250°)	-	16:01 (81.0°)	403,821	25.9%
7	09:59 ↑ (110°)	23:40 ↑ (249°)	-	16:49 (82.0°)	400,925	35.0%
8	10:46 ↑ (111°)	-	-	17:38 (82.2°)	396,834	44.8%

Canopus October 2016

Oct	Moonrise	Moonset	Moonrise	Time	Distance (km)	Illumination
9 -		00:28 ↑ (250°)	11:38 ↑ (110°)	18:28 (81.3°)	391,660	55.1%
10 -		01:16 ↑ (251°)	12:32 ↑ (108°)	19:18 (79.5°)	385,643	65.5%
11 -		02:02 ↑ (253°)	13:29 ↑ (105°)	20:10 (76.6°)	379,153	75.5%
12 -		02:47 ↑ (256°)	14:28 ↑ (102°)	21:02 (73.0°)	372,678	84.7%
13 -		03:31 ↑ (261°)	15:29 ↑ (97°)	21:55 (68.6°)	366,786	92.2%
14 -		04:15 ↑ (266°)	16:32 ↑ (92°)	2:48 (63.7°)	362,052	97.24%
15 -		04:59 ↑ (271°)	17:37 ↑ (86°)	23:43 (58.7°)	358,971	99.8%
16 -		05:45 ↑ (276°)	18:43 ↑ (81°)	Moon does not pass the meridian on this day.		
17 -		06:32 ↑ (282°)	19:50 ↑ (76°)	00:40 (54.0°)	357,862	99.0%
18 -		07:23 ↑ (286°)	20:57 ↑ (72°)	01:38 (49.9°)	358,803	95.0%
19 -		08:16 ↑ (289°)	22:01 ↑ (70°)	02:38 (46.8°)	361,614	88.1%
20 -		09:12 ↑ (291°)	23:02 ↑ (69°)	03:37 (45.0°)	365,905	79.0%
21 -		10:10 ↑ (291°)	23:57 ↑ (70°)	04:36 (44.5°)	371,170	68.4%
22 -		11:08 ↑ (290°)	-	05:32 (45.3°)	376,885	57.2%
23	00:48 ↑ (71°)	12:05 ↑ (287°)	-	06:26 (47.1°)	382,593	46.0%
24	01:34 ↑ (74°)	13:02 ↑ (284°)	-	07:16 (49.8°)	387,947	35.4%
25	02:15 ↑ (78°)	13:56 ↑ (280°)	-	08:04 (53.2°)	392,724	25.7%
26	02:54 ↑ (82°)	14:49 ↑ (276°)	-	08:50 (56.9°)	396,806	17.3%
27	03:31 ↑ (86°)	15:41 ↑ (272°)	-	09:34 (60.9°)	400,157	10.4%

Canopus October 2016

Oct	Moonrise	Moonset	Moonrise	Time	Distance (km)	Illumination
28	04:06 ↑ (91°)	16:32 ↑ (267°)	-	10:17 (64.9°)	402,789	5.2%
29	04:41 ↑ (95°)	17:23 ↑ (263°)	-	11:00 (68.8°)	404,732	1.7%
30	05:16 ↑ (99°)	18:14 ↑ (259°)	-	11:43 (72.5°)	406,008	0.2%
31	05:53 ↑ (103°)	19:05 ↑ (256°)	-			

The Current Constellations in the Sky:

During the winter months our major constellation is Scorpius, often incorrectly referred to as Scorpio. It is the dominating and very easily definable constellation of the winter months.

Immediately to the east of Scorpius near the overhead point is Sagittarius, the Archer. Scorpius has moved westward while Sagittarius is almost overhead and Capricornus, Telescopium, Dorado lie to the east of Sagittarius.

Sandwiched between the upper tail end of Scorpius and the back of one knee of Sagittarius is a small semi circle of stars known as Corona Australis, the Southern Crown. Higher, above Corona Australis, is a line of stars representing Telescopium, while, to the west of Scorpius, in line with its head is the faint constellation Libra.

Sagittarius contains more Messier objects than any other constellation and an almost endless succession of starfields making for excellent winter viewing and observation using either a wide field telescope or a binocular.

Currently we are in overlap between winter and spring, so we have Scorpius going down in the west during the late night/early morning hours and at same time we have our summer constellation Orion, rising which is very clearly visible in the East around 11 pm. Orion's belt will have the Orion Nebula to view and also the famous Horsehead Nebula.

Once again we shall come across Sirius the brightest star in our skies and meet up with Taurus and Pleides and another bright star Aldebaran, in Taurus.

In Spring the constellation Crux, our Southern is at its lowest and to latitudes above Pretoria, it actually sets. It is not down for long before it is seen climbing in its clockwise action again.

Canopus October 2016

The southern hemisphere is blessed with 5 bird constellations, displaying great prominence right now.

Phoenix is very close to zenith.

Grus is slightly to the west of Phoenix. Anair is the brightest star in Grus, Ankaa has that honour in Phoenix.

Lower in the west lies Tucana and lower still, very near the southern cross lies Pavo.

Cygnus the Swan is up north and featured last month's *Canopus*.

Piscis lies between Aquarius and Cetus. It is two fishes tied together by a long cord.

There is nothing exceptional about the constellation except that it lies in the Zodiac, directly above Pegasus in spring.

To the east of Andromeda lies the small constellation that packs a power of importance as it is the first sign of the Zodiac To the ancient Greeks and Babylonians it represented spring and Mars, its reigning planet a sign of warrior strength.



The Myth of Pegasus and Andromeda:

Andromeda:

In Greek mythology, Andromeda was the daughter of Cassiopeia and Cepheus, the king of Ethiopia. Andromeda's mother claimed that they were more beautiful than the sea nymphs, the Nereids.

The Nereids felt insulted by this and complained to the sea god Poseidon. Poseidon threatened to send a flood and a sea monster to destroy the kingdom of Ethiopia. The king was advised by the oracle to sacrifice his daughter. Andromeda was chained to a sea-cliff to be devoured by the sea monster.

Perseus, the nephew of the king of the city of Argos noticed her as he was sailing by and immediately fell in love with her. He promised to rescue Andromeda if her parents would allow him to marry her. Cassiopeia and Cepheus accepted. Perseus killed the monster and freed Andromeda.

Andromeda insisted that their wedding be celebrated. Unfortunately, her parents had forgotten their promise to Perseus. After the marriage, Andromeda left her country to live with Perseus who later became the king of Tiryns and Mycenae. The goddess Athena placed the image of Andromeda among the stars as a reward for keeping her parents' promise.

<http://www.windows2universe.org/mythology/andromeda.html>

PEGASUS THE FLYING HORSE:

Every horse rider surely knows the story of Pegasus. Sitting in a saddle on a galloping horse, there is something eerie yet magical, about the rush of the wind, shushing silently about one's ears, blue skies and sunshine that makes one imagine flying through the skies on Pegasus....

Pegasus was a pure white, winged divine stallion, standing hands high, proud and majestic. His father was Poseidon, who was the horse-god. His mother, Gorgon Medusa.

Pegasus obeyed Zeus, the king of gods. Zeus instructed Pegasus to bring thunder and lightning to Mount Olympus.

It was not an easy task, on his journey he had many trials and deviations to overcome. He was captured by Bellerophon with the help of Athena and Poseidon. On his way and trying to reach to Mount Olympus, Pegasus allowed Bellerophon to ride him in order to defeat a monster, Bellerophon falls off his back.

Zeus, king of the gods, turned Pegasus into the constellation Pegasus and placed him in the sky.

Canopus October 2016

Today, there is much symbolism attached to Pegasus. He has been the symbol of wisdom, of poetry and creator of sources for drawing inspiration.



www.mensxp.com/entertainment/gossip/11723-greek-mythology-s-most-beautiful-goddesses-p3.html
www.mythicalcreaturesguide.com



<http://en.esstatic.us/upl/2016/07/Comet on 19 September 2014 NavCam node full image 2.jpg>

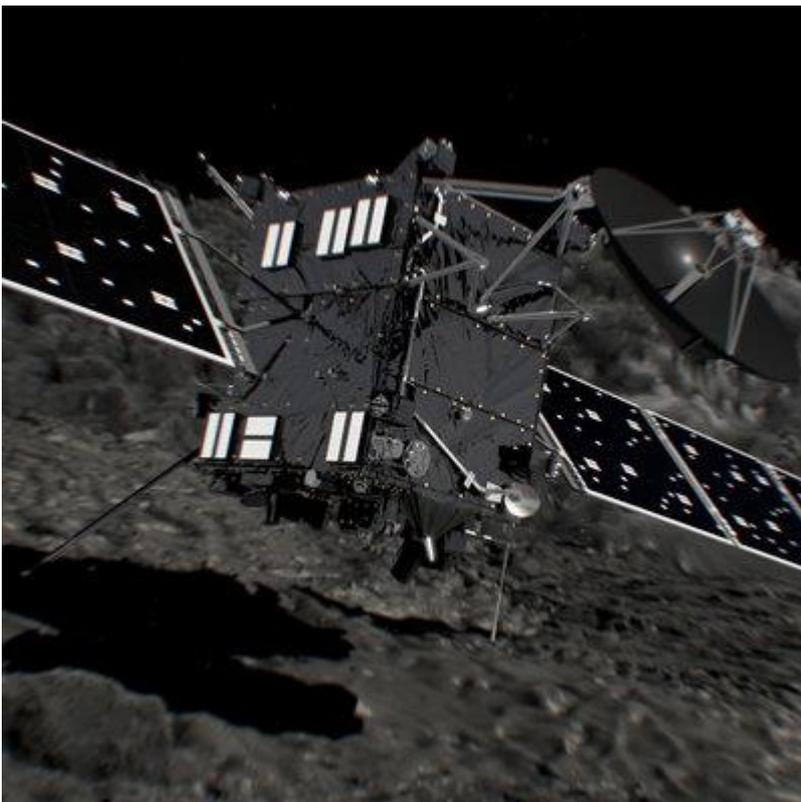
Canopus October 2016

67p/Churyumov-gerasimenko is a Jupiter family comet, originally from the Kuiper Belt. The end of Rosetta's mission was set to happen on 30 September. It occurred and the mission is no more.

Read more...<http://sci.esa.int/home/>

This is the way the Rosetta ended: not with a bang, but with a slow-motion crash.

The historic spacecraft has transformed scientists' understanding of comets over the past two years, as it orbited the 67P/Churyumov-Gerasimenko comet and sent a stream of images and data back to Earth.



[The Two-Way Scientists To Bid A Bittersweet Farewell To Rosetta, The Comet Chaser](http://www.npr.org/sections/thetwo-way/2016/09/30/496042230/watch-rosetta-ends-mission-by-crashing-into-comet)

Now scientists have steered it into the comet for a "Grand Finale" of data-collection, and Rosetta has lost contact with Earth forever.

<http://www.npr.org/sections/thetwo-way/2016/09/30/496042230/watch-rosetta-ends-mission-by-crashing-into-comet>

Canopus October 2016

Planets:

The favourite planets are leaving the sky momentarily. Jupiter is sinking fast and will. Around 11 October, Jupiter and Mercury will be west of the setting sun and fast disappearing from the sky. Jupiter is heading for becoming a morning star and to be seen low in the East around the end of October.

The moon passes Venus, Saturn and Mars in the West at early evening.

On 30 October Venus and Saturn will be 3 degrees north and slowly leaving our skies.

Looking up at the Milky Way:

The Milky Way is like a scarf of faint white or milky looking light, bowing over our sky, rainbow like, from South east to North West and in so doing occupies a fixed part of the celestial sphere.

If there is no moon or, one is in a non-light polluted area, one will be able to observe the Milky Way and find it intriguingly beautiful.

The combined light of millions of stars makes up the Milky Way Galaxy. It is the galaxy we live in. Most of the bright stars one sees, are in the Milky Way Galaxy, even though some appear to be on the outside of the Milky Way, when one looks at the stars on a Star map. This is because most naked eye observed stars, including the large ones, are relatively nearby within the local region one would be looking at. These nearby stars surround us in all directions.

However, there are many, many bigger and brighter stars much further away, on Earth, we perceive them almost as tiny pinpricks of light because of the distance they are away from us.

The distance is measured in light years. As an explanation, a light year is a unit of distance, not time, and this is how distance is measured in space, by light years.

New Zealand, a beautiful country we all know here on Earth is locally and characteristically known as the "land of the Long White cloud". Our Milky Way is not a cloud, though on very clear nights, it could be mistaken for one.

The Milky Way does not move relative to the bright stars, while the clouds are in our atmosphere and move according to high winds.

What is thought to be the centre of the Milky way, is a region called Sagittarius A. Sagittarius A is understood by scientists to be a very complex radio source and is the very centre of the Milky way. Here, there is an enormous black hole where, if stars and other cosmic material get sucked in, they disappear forever.

Surprisingly, relatively young stars used to exist around Sagittarius A, formed by a massive star cluster or a star formation area within a compact gas accretion disk around the central black hole, currently this does not seem to be happening.

When one looks up at the Milky Way, one is looking at the heart of our Galaxy and some 100 billion stars. Because of the distance and the speed at which light travels, it is

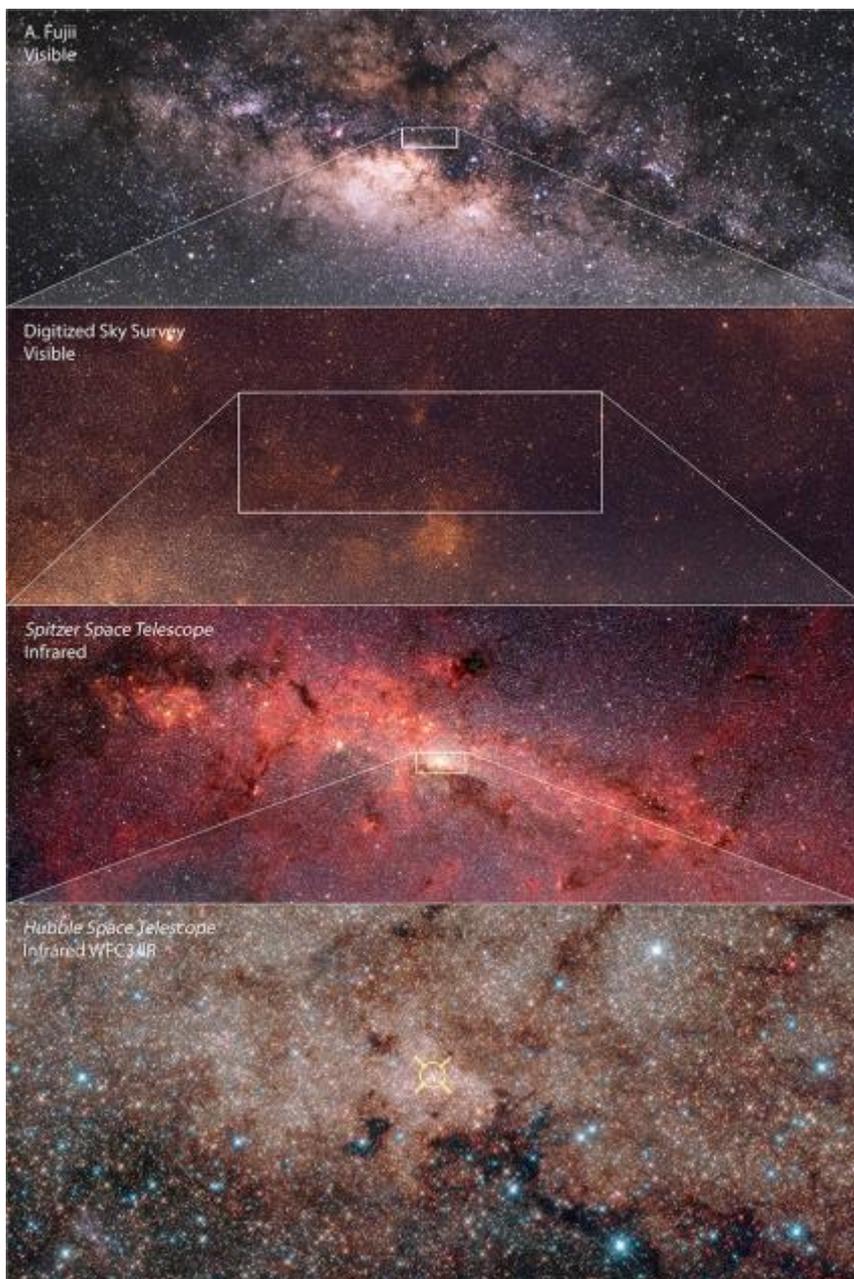
Canopus October 2016

astounding to think that what we are looking at is what ancient civilisations knew when they lived.

Read more.....https://en.wikipedia.org/wiki/Galactic_Center

Hubble's Journey to the Centre of our Galaxy:

Peering deep into the heart of our Milky Way galaxy, NASA's Hubble Space Telescope reveals a rich, diamond studded velvet, of more than half a million stars.



Except for a few blue foreground stars, the stars are part of the Milky Way's nuclear star cluster, the most massive and densest star cluster in our galaxy. So packed with stars, it is equivalent to having a million suns crammed between us and our closest stellar neighbour, Alpha Centauri. At the very hub of our galaxy, this star cluster surrounds the Milky Way's central supermassive black hole, which is about 4 million times the mass of our sun.

Astronomers used Hubble's infrared vision to pierce through the dust in the disk of our galaxy that obscures the star cluster. In this image, scientists translated the infrared light, which is invisible to human eyes, into colours our eyes can see. The red stars are either embedded or shrouded by intervening dust.

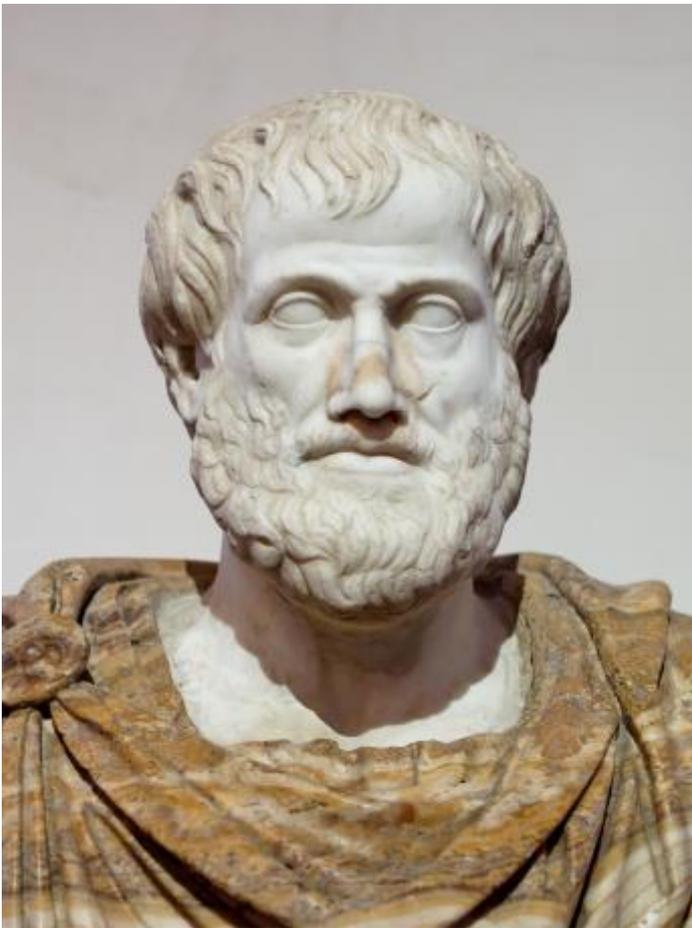
Canopus October 2016

Extremely dense clouds of gas and dust are seen in silhouette, appearing dark against the bright background stars. These clouds are so thick that even Hubble's infrared capability could not penetrate them.

<http://www.nasa.gov/feature/goddard/2016/hubble-s-journey-to-the-center-of-our-galaxy>

Famous People:

Aristotle: 384 - 322 BC)



Aristotle was born in the Greek town called Stagira on the Macedonian coast.

Aristotle was Plato's most famous student, some say he was the master of Greek thinkers. He was also known as the teacher of Alexander the Great.

Plato's finding was that heavenly bodies moved uniformly in perfect circles. To Aristotle it was self-evident therefore, that the Earth was stationary at the centre of these circles. Although Aristotle was a great thinker and a master at his work, the one weak point that Aristotle had was: he relied too much on acceptable theories and never tested them with observational experiments.

One good thing he did was to set up a list he called: "The Natural Conditions of Things" in which he included Plato's heavenly principle of

circles and other ideas what we would call today – matters of science. Much of the Greek philosophical thinking on nature was based on his ideas.

Galileo Galilei: 1564 - 1642

Quote by Galileo: "You cannot teach a man anything, you can only help him find it within himself."

Canopus October 2016

Galileo, astronomer, mathematician, physicist and philosopher.

In 1609, Galileo discovered the existence of the spyglass and began to experiment with telescope making. He improved the optical telescope and used it on the heavens where he discovered the four primary moons of Jupiter, hence the term: Galilean moons – Io, Europa, Ganymede and Callisto.



In Galileo's lifetime, all celestial bodies were thought to orbit the Earth. Supported by the Catholic Church, teaching the opposite of this system was declared heresy in 1615.

Galileo, however, did not agree. His research — including his observations of the phases of Venus and the fact that Jupiter boasted moons that didn't orbit Earth — supported the Copernican system, which (correctly) stated that the Earth and other planets circle the sun.

In 1616, he was summoned to Rome and warned not to teach or write about this controversial theory. But in 1632, believing that he could write on the subject if he treated it as a mathematical proposition, he published work on the Copernican

system. He was found guilty of heresy, and was placed under house arrest for the remaining nine years of his life.

Astronomy for Beginners:

We know that the Earth is part of the Milky Way Galaxy and that the planets, Mercury, Venus, Earth, Mars the inner, hard core planets as well as

the other planets, Jupiter, Saturn, Uranus and Neptune. These Planets are gigantic and known as soft planets because of their gaseous nature, make up our Solar System.

Earth is the fourth hard planet in sequence from the sun. The first of which is Mercury, closest to the sun.

Mercury spins three times around on its own axis while it spins twice around the sun. Both actions are in an anti clockwise direction. If man was on Mercury during this period he would experience only one day and one night. Therefore a day and a night on Mercury takes two Earth years.

Canopus October 2016

Venus is beneath white clouds of carbon dioxide gas. Venus has 90 times more atmosphere than Earth. If our scientists were to send any satellites or space craft to land on Venus, They would never arrive, and be fried like bacon bits to boot.

If it was possible to get through the white gaseous cloud that surrounds Venus, the atmospheric pressure would crush the craft and the gas would finish off any life.

The sunlight on Venus gets reflected off the cloud but the same cloud prevents heat escaping so Venus is a hot dry brown, volcanic planet with a temperature around 500 degrees Celcius on the surface. Definitely not attached to thoughts of romance and beauty!

Mars once, aeons ago, had a warmer, wetter time. Water could have flowed on Mars, conditions could have been very similar to those on Earth.

Mars and Earth are close neighbours in space so one poses the question;

Could simple living cells have existed there? This question has yet to be answered. Today there are popular thoughts that Earth people could exist on Mars but that is hardly the case and yet to be proven.

Radiation from Space:

Light is not all that reaches Earth from outer space. Light is only part of an electromagnetic spectrum. This electromagnetic spectrum includes wavelengths longer and shorter than light. The longer wavelengths include radiowaves, micro radiowaves and infrared waves while the shorter ones make up gamma rays, x rays and ultraviolet rays. However, only light and radio waves pass through the Earth's atmosphere so we have other sections of astronomy to observe and study amongst which are radio astronomy and astronomy studying gamma-ray light which identifies high sources of space radiation.

Radio astronomy is of a hearing nature, thus audio astronomy. Instead of studying light waves one studies radio waves. The operation is very similar to optical astronomy but in radio astronomy, the use of curved mirrors is made to gather and focus radio waves. Radio waves are very much longer than light waves so shiny, clear and clean surfaces on mirrors, is not really a requirement.

More than one radio telescope can be used to focus on one part of the sky. This gives much larger aperture sizes and so allows the gathering of greater detail. A perfect example of this is our SKA or Square Kilometre Array Project in the Karoo where the compact core is concentrated in a circle, one kilometre in diameter. This Square Kilometre Array is designed to detect galaxies far further afield than science has gone before. It also has the possibility to search and resolve a number of current cosmological issues.

Canopus October 2016

ASSA Johannesburg Mailing Lists

It is essential to join our mailing list to automatically receive alerts for all announcements, activity reminders, including public viewing, meetings, star parties and last minute changes.

To subscribe or unsubscribe, merely post a blank e-mail to the indicated addresses:

ASSA Announce General announcements for the Johannesburg Centre	assajhb-subscribe@yahoogroups.com assajhb-unsubscribe@yahoogroups.com
ASSA Canopus Distribution list for the PDF version of our monthly newsletter, Canopus	assacanopus-subscribe@yahoogroups.com assacanopus-unsubscribe@yahoogroups.com

CanopusTeam

Editor: Jess van Elferen (sales@telescope-shop.co.za)

Advertising: Jerome Jooste (astronomersinc@hotmail.co.za)



Do you want to advertise in Canopus?

Canopus is widely read by more than **200** people every month and has been in circulation for more than **30 years!**

For more information please contact *Jerome Jooste*:
072 985 8764, jeromejooste@yahoo.com

Rates for advertorial space	To June 2017:
Digital advert in Canopus and on ASSA JHB web site	R250.00

Our Website, Facebook and Postal Addresses

www.astronomyjhb.co.za

<https://www.facebook.com/assajhb/>

P O Box 412323 Craighall 2024



THE WORLD'S
MOST LOVED
TELESCOPE
HAS EVOLVED

NexStar[®] EVOLUTION

The first ever Schmidt-Cassegrain
Telescope with fully integrated WiFi

Now you can leave your hand control behind and slew to all the best celestial objects with a tap of your smartphone or tablet. Connect your device to NexStar Evolution's built-in wireless network and explore the universe with the Celestron planetarium app for iOS and Android.

Available in 6" and 8".

IPAD and IPHONE SHOWN NOT INCLUDED



Available from specialist retailers and selected dealers nationwide.
Celestron is distributed in SA by G & L Agencies. Trade enquiries welcome.

WWW.GLAGENCIES.CO.ZA

Celestron[®] and NexStar[®] are registered trademarks of Celestron Acquisition, LLC in the United States and in dozens of other countries around the world. All rights reserved. G&L Agencies is an authorised distributor and reseller of Celestron products. The iPhone[®] and iPad[®] are trademarks of Apple Inc., registered in the U.S. and other countries.