Volume 126 No. 9
September 2017

The

Bulletin

Monthly newsletter of the
Astronomical Society of South Australia Inc

ASSA 125 years
1892-2017

In this issue:

- Science Alive! 2017 report
- ASSA Council has suspended the 36" Telescope Project
- Discoveries during ASSA's 5th decade
- Let's go observing near the Pole

VicSouth bookings now open. www.vicsouth.info/2017.htm

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www.assa.org.au

ASTRONOMICAL SOCIETY of SOUTH AUSTRALIA Inc

GPO Box 199, Adelaide SA 5001

The Society (ASSA) can be contacted by post to the address above, or by e-mail to *info@assa.org.au.* Membership of the Society is open to all, with the only prerequisite being an interest in Astronomy.

Membership fees are:

Full Member	$75
Concessional Member	$60
Subscribe e-Bulletin only; discount	$20

Concession information and membership brochures can be obtained from the ASSA web site at:
http://www.assa.org.au
or by contacting The Secretary (see contacts page).

Member Submissions
Submissions for inclusion in The Bulletin are welcome from all members; submissions may be held over for later editions.

Wherever possible, text submissions should be sent via e-mail or posted on CD-ROM in almost any word processing format and may still be submitted handwritten or typed. Your name may be withheld only if requested at the time of submitting. Images should be high resolution and uncompressed, e.g. TIFF file formats, although high resolution JPEGs are acceptable. Your full name and object designation must be provided with each image and will be published. Equipment/exposure etc details are welcome but optional.

Advertising & Classifieds
Small adverts and classifieds are free for members (space permitting). Commercial advertising is available at a cost of $50.00 per quarter page per issue.

All enquiries and submissions should be addressed to The Editor and preferably sent by e-mail to:
editor@assa.org.au

For large files (e.g. on CD) or hardcopy items, post to:
Joe Grida
Editor, The Bulletin
PO Box 682,
Mylor SA 5153

Contributions should reach the Editor no later than the 7th of each month, for publication in the following month's issue of The Bulletin

In this issue:

Sister Society relationships with:

Orange County Astronomers
www.ocastronomers.org
Colorado Springs Astronomical Society
www.csastro.org
Central Arkansas Astronomical Society
www.caasastro.org
Arkansas-Oklohoma Astronomical Society
www.aoas.org
Gruppo Astrofili di Piacenza (Italy)
www.astrofilipc.it

Cover photo: M17 (The Omega Nebula, also known as the Swan Nebula) in Sagittarius imaged by **Paul Haese** at Clayton SA. GSO RC12 telescope on the SBIG PME mount with the SBIG STXL11002 camera. 14 hours of data composed of LRGB, Ha and OIII.
See more of Paul's amazing photos at www.paulhaese.net.

Activities

September 2017 - the month at a glance

Happy Birthday, ASSA
Celebrating 125 years in 2017!

General Meeting

Wednesday, 6 September, 2017
@ 8:00pm
Kerr Grant Lecture Theatre
2nd Floor, Physics Blg
University of Adelaide
North Terrace, Adelaide

Guest Speaker:

Dr Ellie Samson
Desert Fireball Network

Desert Fireball Network

A meteorite fall precisely observed from multiple locations allows us to track the object back to the region of the Solar System it came from, and sometimes link it with a parent body, providing context information that helps trace the history of the Solar System. The **Desert Fireball Network** (DFN) is built in arid areas of Australia: its observatories get favourable observing conditions, and meteorite recovery is eased thanks to the terrain. After the successful recovery of two meteorites with 4 film cameras, the DFN has now switched to a digital network, operating 51 cameras, covering 3 million km^2 of double station triangulatable area. On 31 December 2015, the first meteorite from the digital systems was recovered from Kati Thanda-Lake Eyre South: Murrili (a 1.6kg H5 ordinary chondrite). The second meteorite recovered by the digital network was found 6 days after it fell on Halloween night in 2016 in the Western Australian wheatbelt.

Planning on going observing?

Save yourself unnecessary travel and time. If the weather looks doubtful where you are, check with the following people to see if the event is still on (or see www.assa.org.au after 5pm).

Stockport Observatory (DO 3-13)

Observatory 8528 2284

Lyn Grida 8391 5377

Tony Beresford 8338 1231

Heights Observatory (DO 3-34)

Robert Bronca 8266 7504

Whyalla

Peter Mayfield 0405 410 895

Tooperang

Jeff Lowrey 0429 690 610

Northern Yorke Peninsula

Tony "Hendy" Henderson 0429 352 382

Riverland

Tim Vivian 0407 800 225

September 2017 Calendar

Day		Time	Activity
Wed	6	7:00pm	Beginners' Meeting, Adelaide
Wed	6	8:00pm	General Meeting, Adelaide
Thu	7	7:30pm	Whyalla Members' Meeting
Sat	16	8:00pm	Members' Viewing Night, Stockport
Tue	19	7:30pm	ASSA Council Meeting
Fri	22	8:00pm	Public Viewing Night, The Heights
Fri	22	8:00pm	Public & Members' Viewing, NYP
Sat	23	8:00pm	Members' Viewing Night, Stockport
Sat	23	8:00pm	Members' Viewing Night, Tooperang
Fri	29	7:30pm	Astro-imaging Group, Modbury

Note: Times shown above and throughout this document are:
2 Oct 2016 to 1 Apr 2017 : South Australia Summer Time (UTC+10:30)
2 Apr 2017 to 1 Oct 2017 : South Australia Standard Time (UTC+ 9:30)

Astronomy Education

Wednesday, 6 September 2017 @ 7:00pm
Kerr Grant Lecture Theatre

Observing with a small telescope

So you've bought your flash new telescope and are wondering what to do with it.

This session will cover setting up for a viewing night, polar alignment, eyepieces, filters and what types of objects you can expect to see.

Guest Speaker Biography

Dr Ellie Samson
Desert Fireball Network,
Curtin University, WA

Ellie joined the Desert Fireball Network team in December 2012 after completing an MSci in geophysics at Imperial College, London.

She has recently completed her Phd with the DFN and will be continuing with the team as a postdoc.

She has been looking at ways to improve trajectory modelling - determining how big the fireball bodies are, what they're made of, and whether there will be any meteorites to find.

She also collaborates with experts in tracking techniques at the Defense, Science and Technology Group in Adelaide.

Astro-Imaging Group Meeting

Friday 29 September, 2017 @ 7:30PM
University Of The Third Age,
22 Golden Grove Rd, Modbury North
Enter via Gold Court to access Car Park 1

Planetary Imaging

Paul Haese will be presenting a tutorial and workshop on planetary imaging. Paul will run through a brief tutorial on planetary imaging capture and then progressing onto a live workshop on processing of planetary data.

It will involve the use of programmes such as Astrostakkert, Astraimage and Photoshop. This workshop will show attendees how to process data from start to finish and give a good working knowledge of the sharpening and colour balancing techniques he uses to produce his images.

Please bring any recent images that you would like to share with the group on a USB memory stick.

Any questions, contact the Group Co-ordinator,
Jeff Lusher: imaging@assa.org.au

New Members' Night @ Stockport Observatory

16 September, 2017

If you have joined ASSA for the first time or perhaps you have been a member for a while and have never been to Stockport, then here is your chance.

A night for new members is to be held at Stockport Observatory on the 2nd of April, which is a regular members' night, so that you can meet the more experienced observers as well as other new members.

The night will commence at 4:00pm with a tour of the facility followed by a mini telescope clinic, so bring along your scopes and we will help with questions you may have regarding setting up and using them.

At the BBQ that follows, you will have the opportunity to mingle with your fellow members and get the chance to see some of the equipment others have brought along before it gets too dark.

Later, you will get the chance to view the heavens through the Society's telescopes or any of the other scopes that will be available on the night.

So if you are new to ASSA and want to experience Stockport for the first time, then come along to a night dedicated to you and get to know your society and the people who make it what it is.

It is important to let me know if you intend to come to this event, so we can cater for the BBQ. Send an email to beginners@assa.org.au or ring (08) 8523 0211 a/h.

Colin Hill

36" telescope project cancellation

The 36" telescope has been an ASSA project for nearly two decades. The project is unfunded and the full costs of the project have not been confirmed but estimates put the total cost at more than $400,000. To date, work on the design of the telescope (including the ½ scale test bed that was housed in the small dome at Stockport) and manufacture of a grinding machine for the mirror has been undertaken plus some of the grinding of the mirror, but little else. The final home for the telescope has not been decided nor acquired.

The 36" telescope was to be an additional research grade telescope to enhance ASSA's capability to undertake research currently being undertaken with the 20" telescope at Stockport.

The 36" project was suspended while the Society concentrated on the replacement of the dome over the Charles Todd Observatory at Stockport. The Observatory is very close to being fully operational again and includes significant upgrades to the systems that will enhance the performance of the 20" telescope. Recommissioning of the 20", completing the new turret and other works needed at Stockport are anticipated to occupy the Instrument Officer and his team for some time to come, including other restoration work that is also required to the 18" Dobsonian and 12" Cassegrain telescopes. Recommencement of active work on the 36" is not anticipated for a considerable time.

In the intervening years, telescope design and availability has moved on with commercial telescopes, of similar capabilities and lower cost to the proposed 36", on the market. The initial argument that ASSA could make the 36" at a lower cost to commercial telescopes is no longer valid.

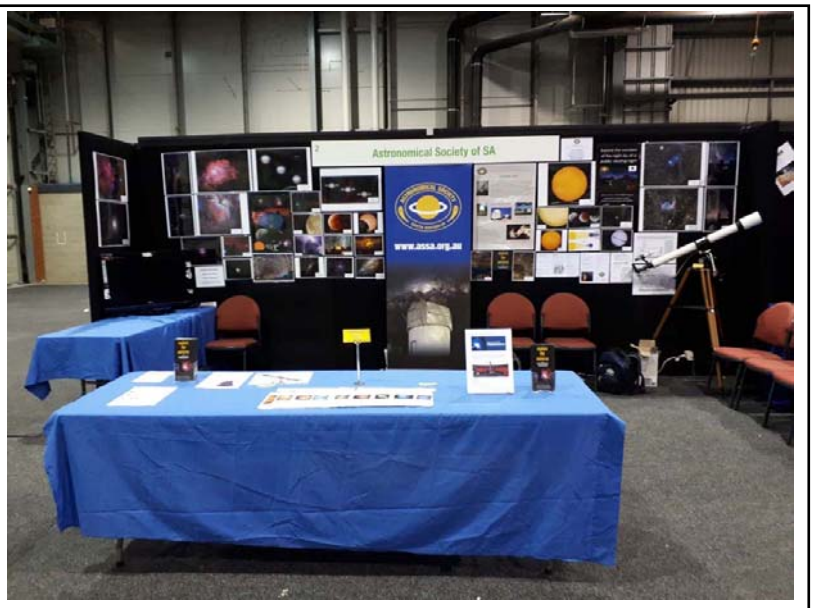
ASSA is not in a position to fund the 36" telescope and investigations over the past decade have indicated that ASSA is very unlikely to secure external (inc. Government) money to complete the project in the foreseeable future.

The ASSA Council considered that continuing work on the 36" telescope is not good use of ASSA resources and has decided to cancel all work on the 36" telescope. If the situation changes, the Council will reconsider the project.

All moneys collected for the 36" project will be diverted to enhancing the scientific and observational capability of ASSA's equipment.

The Council thanks all of the members who have worked on the project design, mirror grinding and securing funds.

Science Alive Report 2017



Science Alive, now in it's 12th year, saw the ASSA once again interacting with the public. The ASSA has participated since the inception of the event, not missing out on any years to date. There were record crowds there this year with the public possibly looking for something to do indoors with the wild weather outside. We had astronomy movies running whilst our volunteers engaged the public in various ways from playing our 'line up the planets in order from the sun' game to showing off member's wonderful images on the back wall.

Many were interested in astronomy and the ASSA and hundreds of our brochures were taken by enthusiastic people. Many stayed to talk and find out more about the society, it's facilities and membership. It's very rewarding to see the gleam in the eyes of young people who wish to take the hobby further. They sure have come to the right place for that.

A big thank you to our club volunteers, many repeat helpers from previous years, without whose assistance ASSA would not be able to be part of such an important outreach opportunity. Fresh faces are always encouraged to participate and extensive astronomical knowledge is not a prerequisite, just an interest in sharing our hobby. Those members who helped deserve mentioning. They are Greg Weaver, Rod Le-Naine Smith, Wendy Dowling, Bryan Kirchner, Trish Ellin, Rob & Bonnie Jenkins, Lyn Grida and myself.

Until next year, Gerard O'Born.

History

Andrew Collings reviews some of the astronomical discoveries since ASSA was formed

1942-1951

With more than 130,000 people involved in the Manhattan Project it's a wonder anything happens not related to creating the world's largest mushroom via the atomic bomb. Fortunately, the government wanted a synthetic rubber replacement and the German High Command started using a new cypher machine that needed decoding. After the war, from ENIAC to SCIRAC computers proceed in a succession of 'AC's becoming faster and more easily programmed. They are able to solve increasingly complicated mathematical problems to help in the advancement of science. So, of course, by the end of this decade we have computer music and computer games.

1942:
Radio astronomy takes a step forward when British army research officer James Hey investigates severe noise jamming of British anti-aircraft radar only to discover this time it wasn't the Nazis but radio waves being emitted by the sun.

Isaac Asimov introduces the 'Three Laws of Robotics' in the short story *Runaround* published in *Astounding Science-Fiction*.

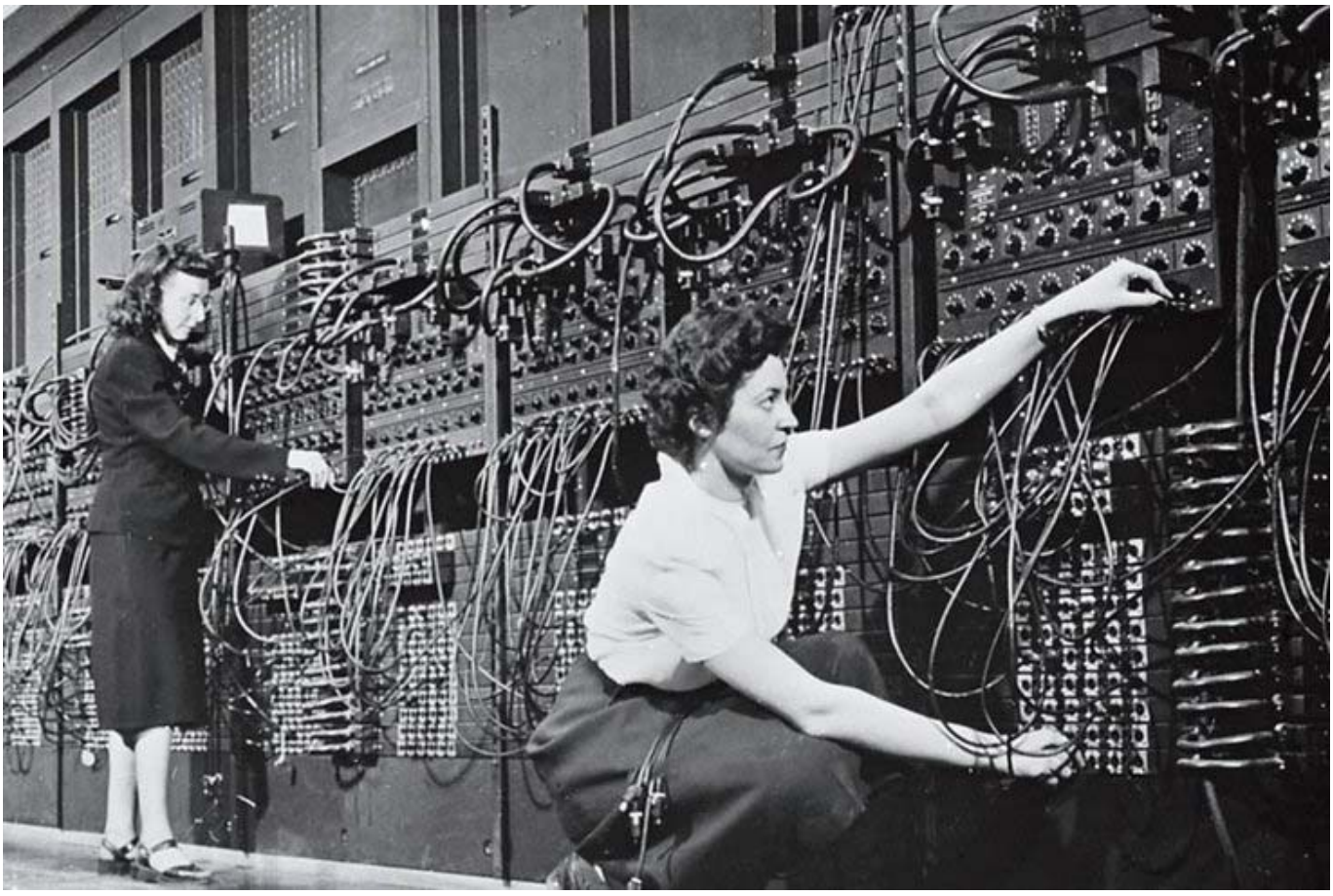
On 2nd December the first nuclear reactor, Chicago Pile-1, goes critical under the squash court of the University of Chicago. The work of Enrico Fermi, Leó Szilárd, George Weil and the rest of the Chicago pile team advance the war effort but probably do nothing for the popularity of squash.

1943:
Underwater exploration becomes easier with the development of the Aqualung by Jacques Cousteau and Emile Gagnan.

The ENIAC Project (Electronic Numerical Integrator and Computer) starts. The programmable ENIAC receives a patent as the first electronic digital computer. *(See photo below).*

Seeking a substitute to synthetic rubber for the US War Production Board James Wright creates Silly Putty. Not wanted by the government, it is marketed as a toy a few years later and becomes one of the most popular of the century. It even ends up on the Apollo 8 moon mission securing items in zero gravity!

Warren S. McCulloch and Walter H. Pitts publish *A Logical Calculus of the Ideas Immanent in Nervous Activity*, a seminal paper in the field of artificial neural networks.



History

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On October the 3rd, the first V-2 rocket is successfully launched at Peenemünde, Germany. Flying 147 km and attaining a height of 84.5 km it is the first man-made object to reach space.

1944:
Without US citizenship, German Walter Baade is confined to Los Angeles County and with most of the other Mt Wilson astronomers involved in war duties, Baade has nearly unlimited access to the Hooker telescope. In the dark skies of the wartime blackouts, he observes two distinct populations of stars, old and young, and opens up the fields of stellar and galactic evolution.

The Colossus becomes operational in January 1944. In 1940 the German High Command began to use the Lorenz SZ40 cypher machine to encrypt communication. As manual translation took 4 to 6 weeks a decoding machine needed to be developed. Design of Colossus began in March 1943. After the war 8 of the 10 machines are dismantled. The remaining 2 were dismantled in about 1960 when all drawings of the machine were burned. Colossus had been and was to remain a secret.

1945:
Konrad Zuse begins work on the first algorithmic programming language, Plankalkül (Plan Calculus).

At 5:29am on July 16, 1945 'The Gadget' is detonated and the Atomic Era begins. Although the Trinity test is a success, *(see photo below)* the observers reactions vary. "I am become Death, the destroyer of worlds" quotes Oppenheimer from the Bhagavad Gita. The test director Ken Bainbridge is less poetic, "Now we're all sons of bitches." Several participants sign petitions against using such weapons.

The uranium bomb 'Little Boy' drops on Hiroshima on August 6. The 10 kiloton explosion kills 66,000 people and injured 69,000. On August 9, the plutonium bomb "Fat Man" is deployed on Nagasaki. Missing its target by over a mile and a half and constrained by geology the larger bomb still levels nearly half the city with almost 40,000 deaths and over 25,000 injuries. Death tolls in both cities double over the coming months. Analysis estimates the bombs utilized only 0.1% of their explosive capabilities.

1946:
Reginald Daly of Harvard University proposes the Moon was ejected from the earth after an impact with another body. His idea is largely ignored until reproposed in 1974.

ENIAC goes into operation. Being electronic it is 1000 times faster than its electro-mechanical contemporaries such as the Harvard Model 1 which incorporates a 50 foot cam shaft! Chewing through 160kW per hour ENIAC is the first large scale electronic digital computer known to the public and garners the excitement of scientists and industry alike. Unfortunately for ENIAC's dreams of priority the existence of the older Colossus is revealed in the 1970s and ENIAC's patent is later ruled invalid due to the Atanasoff Berry Computer.

The construction of EDVAC is contracted. Delivered in 1949 EDVAC differs from ENIAC in that it is binary not decimal and its program was stored in electronic memory rather than by people setting physical patch cords.

Will F Jenkins publishes *A Logic Named Joe* in *Astounding Science Fiction*. Nearly five decades before the internet this prescient short story describes the capabilities of computers (Logics) interconnected in a massive, worldwide network.

Noticing a peanut bar melting in his pocket while working with active radar Percy Spencer proceeds to shower the lab with magnetron popped popcorn and explodes an egg in the face of a fellow engineer… or so the story goes. Whatever the real sequence of events Raytheon produces the first commercial microwave oven in 1946.

1947:
The Polaroid Camera is demonstrated. When released it is able to develop a photo in about a minute.

Flying the X-1, Chuck Yeager becomes the first person to break the sound barrier in level flight.

While working on improving electron microscopes Dennis Gabor develops the concept of holography. Despite attempts the first hologram awaits the invention of the laser with its coherent light before becoming a reality.

With car phones in mind Bell Labs engineer Doug Ring produces an 8 page memorandum on the subject 'Mobile Telephony - Wide Area Coverage' in which he describes a

cellular phone network. It is never published outside the laboratory.

John Bardeen and Walter Brattain invent the first point-contact transistor. This little inventions sets the stage for ever shrinking technology and an argument between audiophiles that goes for… well, it's still going.

1948:
Improving on the design from the previous year William Shockley invents the junction transistor. Along with Brittain and Bardeen, Shockley receives the Nobel Prize in Physics for the transistor in 1956. Tubes. Solid State. Tubes. Solid State. See, it's still going!

Mount Wilson's reign ends as Mount Palomar becomes home to the Hale Telescope, the largest telescope in the world. Fashioned in Pyrex by the Corning Glass Factory the first casting of the 200 inch 14.5 ton mirror fails. The second takes a month to melt the glass, holds the glass at pouring temperature for a further month and then cools the blank over a ten month period. It then has to be shaped. In total the mirror spends 11.5 years in the optical shop. The Hale telescope has several light paths; f/3.3 with a 16.76m focal length, f/16 at 81.3m and f/30 at 152m. With funding secured in 1928 this 20 year project out lasted Hale. Although he died 10 years before its dedication Hale is again, in large part, responsible for a telescope that pushes technology to its limits. The Hale Telescope sees first light in 1949 when Edwin Hubble images NGC 2261.

In opposition to the big bang theory Fred Hoyle, Thomas Gold and Hermann Bondi propose the steady state universe. In this model the universe has no beginning and no end, it expands continuously, with new matter constantly created to maintain a constant density.

Ralph Alphers Ph.D. thesis concerns how chemical elements are created in the initial moments of a rapidly expanding universe and predicts the Cosmic Microwave Background as the residual radiation to this explosion. Alpher's doctoral thesis defence gains rare public attention and even a cartoon in the Washington Post. Later that year he collaborates with Robert Herman to calculate the temperature of the residual radiation.

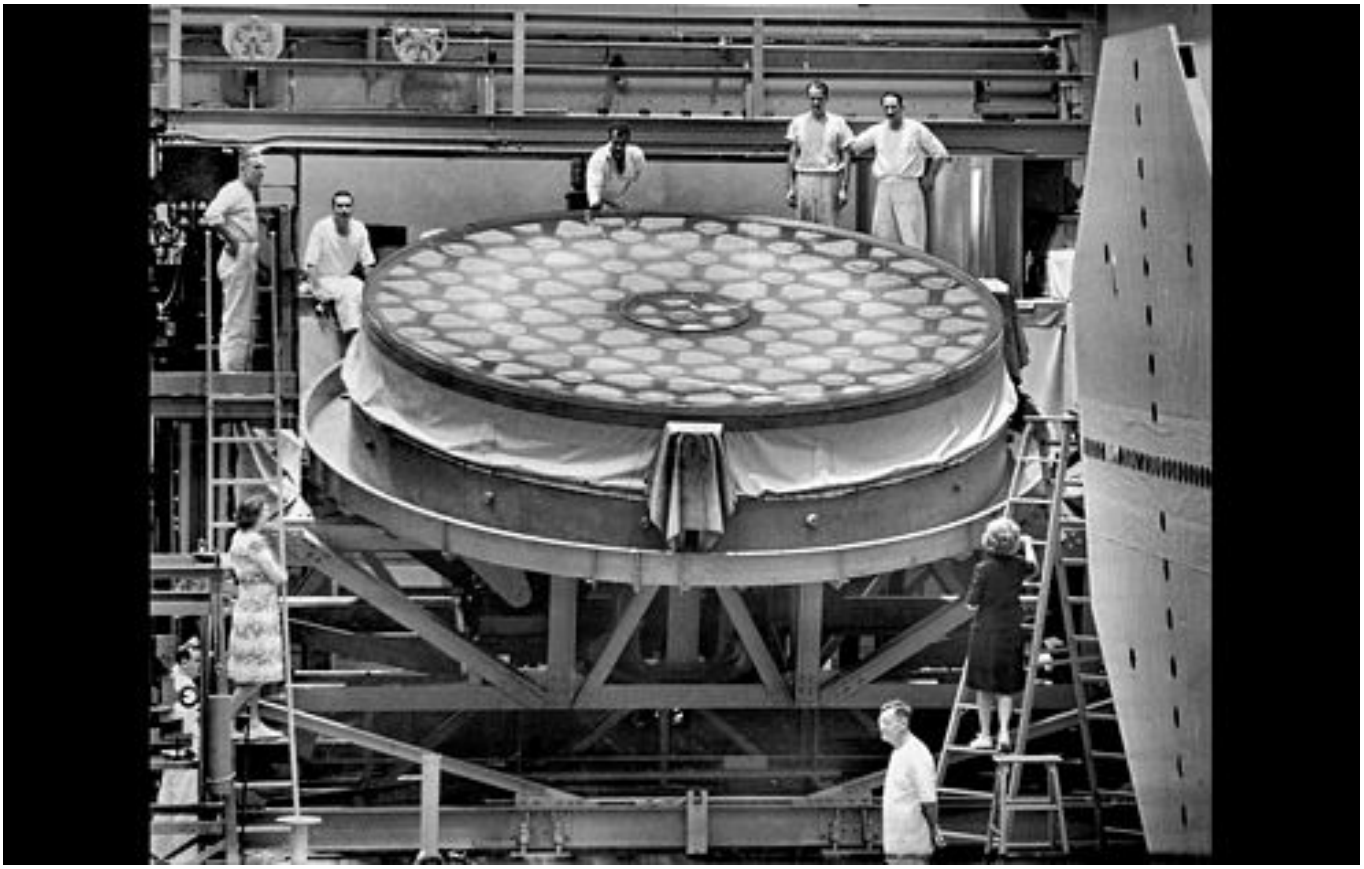
George de Mestral takes a microscope to the cockleburs clinging to his pants after a hike and comes up with the idea of Velcro.

The Small Scale Experimental Machine tests the first electronic random access memory.

Norbert Wiener publishes the book *Cybernetics*, which has a major influence on research into artificial intelligence and control systems.

Miranda, the smallest and inner most moon of Uranus is discovered by Gerard Kuiper at the McDonald Observatory.

Radio astronomy becomes serious as Bolton, Stanley and



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Slee discover the powerful radio sources Taurus A, Virgo A and Centaurus A which identify with the Crab Nebula and the galaxies M87 and NGC 5128 respectively.

1949:
Neptune gets a second moon as Gerard Kuiper discovers Nereid.

Another step in artificial neural networks is taken when Donald Hebb proposes a law for synaptic neuron learning in his paper *The Organization of Behaviour*.

The modem is developed to transfer radar signals.

The De-Havilland Comet, which has nothing to do with astronomy makes its first test flight. It is the first commercial passenger jet.

The world's first commercially available computer, the Ferranti Mark 1, is released. Only 2 are sold and the second at a huge discount.

The first atomic clock is an ammonia maser device less accurate than contemporary quartz clocks but is proof of concept.

The term Big Bang is coined by Fred Hoyle.

Elsie, an electro-mechanical robot 'turtle' is built by Grey Walter to seek moderate light avoiding darkness and bright light. Obviously highlighting serious omissions in Asimov's Laws of Robotics Elsie is particularly drawn to women's stockings.

1950:
Radio-Electronics magazine publish Edmund Berkeley's articles and plans for the world's first personal computer, Simon.

Unknowingly Chien-Shiung Wu and Irving Shaknov create the first entangled photons investigating electron positron annihilation.

Jan Oort proposes comets originate from a vast cloud of small bodies that orbit the Sun at a distance of about one light-year.

1951:
Seth Nicholson discovers Jupiter XII at the Mount Wilson Observatory.

Marvin Minsky builds SNARC, the first randomly wired neural network learning machine.

Squee the Robotic squirrel hunts for nuts, well, tennis balls using a couple of light sensors and contact switches and takes them back to its nest.

In preparation for the first Australian Conference on Automatic Computing Machines, Geoff Hill programs CSIRAC to play several songs including 'Colonel Bogey'. Later in the year the BBC records the Ferranti Mark 1 playing a medley including 'God Save the King', 'Baa Baa Black Sheep', and 'In the Mood'.

The United States performs the first small scale thermonuclear hydrogen bomb test.

UNIVAC becomes the first successful commercial computer created for civilian use. 46 are sold.

The Experimental Breeder Reactor-I begins operating in Idaho. It is the world's first electricity producing nuclear power plant.

Discovering the radio waves generated by interstellar hydrogen provides Jan Oort with a new method for mapping the spiral structure of the galaxy. Oort had been interested in the potential of radio astronomy since reading a paper by Grote Reber in a copy of the *Astrophysical Journal* smuggled into Holland during the war.

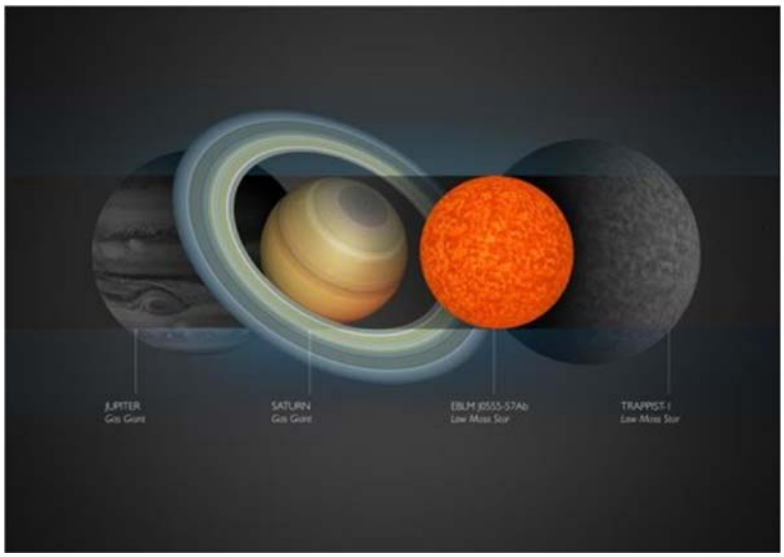
Smallest-ever star discovered by astronomers

The smallest star yet measured has been discovered by a team of astronomers led by the University of Cambridge. With a size just a sliver larger than that of Saturn, the gravitational pull at its stellar surface is about 300 times stronger than what humans feel on Earth.

The star is likely as small as stars can possibly become, as it has just enough mass to enable the fusion of hydrogen nuclei into helium. If it were any smaller, the pressure at the centre of the star would no longer be sufficient to enable this process to take place. Hydrogen fusion is also what powers the Sun, and scientists are attempting to replicate it as a powerful energy source here on Earth.

These very small and dim stars are also the best possible candidates for detecting Earth-sized planets which can have liquid water on their surfaces, such as TRAPPIST-1, an ultracool dwarf surrounded by seven temperate Earth-sized worlds.

The newly-measured star, called EBLM J0555-57Ab, is located about six hundred light years away. It is part of a binary system, and was identified as it passed in front of its much larger companion, a method which is usually used to detect planets, not stars.



Above: *Smallest star ever discovered. Very small and dim stars are the best possible candidates for detecting Earth-sized planets which can have liquid water on their surfaces. Credit: Amanda Smith*

"Our discovery reveals how small stars can be," said Alexander Boetticher, the lead author of the study, and a Master's student at Cambridge's Cavendish Laboratory and Institute of Astronomy. "Had this star formed with only a slightly lower mass, the fusion reaction of hydrogen in its core could not be sustained, and the star would instead have transformed into a brown dwarf."

EBLM J0555-57Ab was identified by WASP, a planet-finding experiment run by the Universities of Keele, Warwick, Leicester and St Andrews. EBLM J0555-57Ab was detected when it passed in front of, or transited, its larger parent star, forming what is called an eclipsing stellar binary system. The parent star became dimmer in a periodic fashion, the signature of an orbiting object. Thanks to this special configuration, researchers can accurately measure the mass and size of any orbiting companions, in this case a small star. The mass of EBLM J0555-57Ab was established via the Doppler, wobble method, using data from the CORALIE spectrograph.

"This star is smaller, and likely colder than many of the gas giant exoplanets that have so far been identified," said von Boetticher. "While a fascinating feature of stellar physics, it is often harder to measure the size of such dim low-mass stars than for many of the larger planets. Thankfully, we can find these small stars with planet-hunting equipment, when they orbit a larger host star in a binary system. It might sound incredible, but finding a star can at times be harder than finding a planet."

This newly-measured star has a mass comparable to the current estimate for TRAPPIST-1, but has a radius that is nearly 30% smaller. "The smallest stars provide optimal conditions for the discovery of Earth-like planets, and for the remote exploration of their atmospheres," said co-author Amaury Triaud, senior researcher at Cambridge's Institute of Astronomy. "However, before we can study planets, we absolutely need to understand their star; this is fundamental."

Although they are the most numerous stars in the Universe, stars with sizes and masses less than 20% that of the Sun are poorly understood, since they are difficult to detect due to their small size and low brightness. The EBLM project, which identified the star in this study, aims to plug that lapse in knowledge. "Thanks to the EBLM project, we will achieve a far greater understanding of the planets orbiting the most common stars that exist, planets like those orbiting TRAPPIST -1," said co-author Professor Didier Queloz of Cambridge' Cavendish Laboratory.

Story Source: *University of Cambridge. "Smallest-ever star discovered by astronomers." ScienceDaily. ScienceDaily, 11 July 2017. <www.sciencedaily.com/releases/2017/07/170711220046.htm>.*

Solar System Highlights

The major planets during September 2017

by John Newell

The spring equinox is on the 23rd at 5:32am. On the 1st the **Sun** will rise at 6:39am and set at 5:52pm, on the 30th sunrise will be at 5:58am and Sunset at 6:14pm (Subtract 4 minutes per degree East of Adelaide and add 4 minutes for each degree West).

Full **Moon** is on the 6th at 4:33pm, last quarter on the 13th, Perigee on the 14th. New Moon is on the 20th at 3:01pm and first quarter is on the 28th.

Mercury rises at 6:04am on the first, reaches greatest western elongation of 17.9 degrees on the 12th, reaches perihelion on the 15th, rises with Mars and the Moon on the 19th and rises at 5:48am on the 30th.

Venus rises at 5:07am on the first. On the 18th in daylight the crescent Moon occults Venus between 10am and 11:20am (from Adelaide). On the 30th she rises at 5am.

Mars in Leo, rises with Mercury beneath Venus at 6:14am on the first, rises with the Moon and Mercury on the 19th and rises after Venus at 5:09am on the 30th.

Ceres magnitude 8.2, rises at 4:22am on the first, rises with the Moon on the 16th, moves from Gemini to Cancer on the 17th and rises at 3:13am on the 30th.

Jupiter in Virgo, sets at 9:15pm on the first, passes Spica on the 13th, sets with the Moon on the 22nd and sets at 7:49pm on the 30th.

Saturn passing Scorpius, sets at 2am on the first, sets with the Moon on the 27th and sets at 12:11am on the 30th. It is the end of the wonderful Cassini mission this month, the satellite will disintegrate in Saturn's atmosphere on the 15th, having achieved so much since its Huygens probe sent us pictures of river systems and rocks on the surface of Titan in 2005 *(see artist's depiction below).*

Uranus magnitude 6.1 in Pisces, rises at 9:48pm on the first, rises with the moon on the 9th and rises at 7:49 pm on the 30th.

Neptune magnitude 7.6 in Aquarius, rises at 6:11pm on the first, reaches opposition on the 5th, rises with the moon on the 6th and sets at 4:57 am on the 30th.

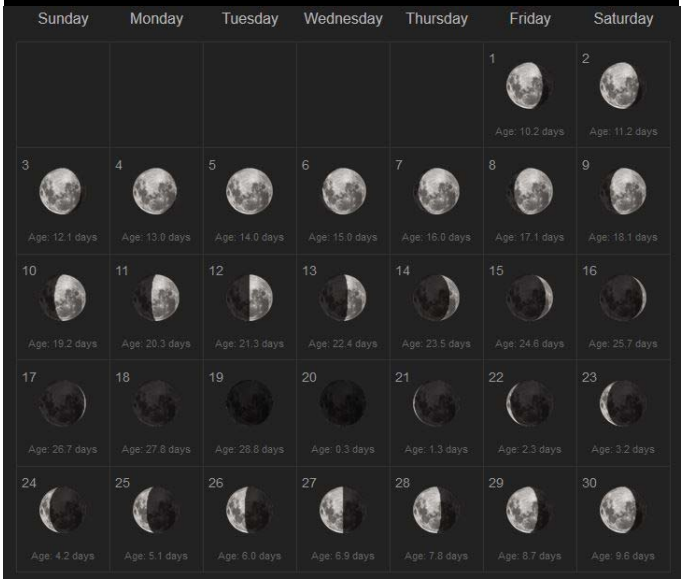
Pluto magnitude 14.2 in Sagittarius, sets at 3:51am on the first, sets with the moon on the 2nd and sets with the Moon again at 1:57am on the 30th.

Diary of phenomena

September 2017

d	h(UT)	
1	1	Moon furthest South (-19.4°)
5	5	Neptune at opposition
5	12	Mars 0.7°N of Regulus
6	5	Neptune 0.7°N of Moon
6	**7**	**FULL MOON**
10	4	Mercury 0.7°S of Regulus
11	23	Jupiter 3.1°N of Spica
12	12	Aldebaran 0.5°S of Moon
12	12	Mercury greatest elong W(18°)
13	**6**	**LAST QUARTER**
13	16	Moon at perigee
14	13	Moon furthest North (19.4°)
16	14	Mercury 0.0°N of Mars
18	0	Venus 0.5°N of Moon
18	5	Regulus 0.1°S of Moon
18	19	Mars 0.1°S of Moon
18	23	Mercury 0.0°N of Moon
20	2	Venus 0.5°N of Regulus
20	**5**	**NEW MOON**
22	20	Equinox
27	5	Moon at apogee

Moon Phases - September 2017



Southern Hemisphere Comets

by Michael Mattiazzo

A roundup of bright & telescopic comets visible for southern hemisphere observers

Comet prospects for September & October 2017

C/2015 V2 Johnson

Peaked at magnitude 7.5 in June 2017 and is now fading as it recedes from both the Sun and the Earth. During September, Comet Johnson will be well situated as it treks southeast wards through Lupus, Norma and Ara, during evening hours.

At the start of September, the magnitude 9.5 comet will be located in Lupus, between Epsilon and Lambda Lup, although moonlight will interfere.

It will be 15' NE of planetary nebula NGC 5882 on Sep 3. The first opportunity for dark sky viewing occurs on the evening of September 8. On September 14, the now magnitude 10 comet crosses into Norma.

Moonlight interferes from September 25 until after the full moon of October 6, when the now magnitude 10.5 comet can be found in Ara.

C/2017 O1

At the time of writing the IAU have not officially named this new comet. The preliminary orbit:

- closest to Sun on 2017 October 14 at 1.50AU
- closest to Earth on 2017 October 18 at 0.72AU
- maximum magnitude 7-8 in October 2017?

On July 19.32 UT, K. Stanek, Ohio State University, reported the discovery of a comet in the course of the "All-Sky Automated Survey for Supernovae" (ASASSN) program, from images taken with the 14-cm "Cassius" survey telescope at Cerro Tololo in Chile. http://www.astronomy.ohio-state.edu/~assassin/index.shtml The comet appeared magnitude 15.

Soon after this discovery was posted on the possible comet confirmation page PCCP, reports of a large coma were noted.

I made a visual observation on 2017 July 24.83 using 25x100mm binoculars, where the comet appeared at magnitude 10.5 with a very large diffuse coma 5' wide. It is very unusual in this day and age to see a comet at discovery, so bright. The comet was located in Cetus, but much better situated for southern observers.

Mid winter weather and the closure of the Siding Spring survey may have contributed to the later discovery. Another possibility is that the comet had undergone a recent outburst. If this is the case, my magnitude estimates below are purely guesswork!

On September 1, you will find the possibly magnitude 9 comet in Taurus, about 4 degrees east of Omi Tau. It is best observed in the hour before dawn and a dark site is needed o see the large diffuse coma. Moonlight interferes between September 4-14.

Above: *Comet C/2017 O1 imaged by the author on July 24, 2017 @ 20:00UT from Swan Hill, Victoria. Canon 60Da DSLR and a Sigma 200mm lens, 5 minute exposure. FOV 2 degrees. North is at lower left.*

The comet treks northwards at 1 degree per day.

It is about 4 degrees east of the Pleiades on the morning of the 20th. By then it may have brightened to magnitude 8. On Sep 28, it crosses into Perseus. The morning of October 2 will effectively be the last observing opportunity for southerners as moonlight then interferes, and the comet dips below the northern horizon.

96P Machholz

Arrives at perihelion on 2017 Oct 27 at 0.12AU. This comet will peak at magnitude 2, but unfortunately too close to the Sun to observe! Southerners can see it rapidly brighten on its way to perihelion from early to mid October when the then 8th magnitude comet is lost in evening twilight.

The first opportunity occurs after the October full moon. On October 8, the magnitude 11 comet will be 4 degrees NE of globular cluster Omega Centauri. On October 10, the magnitude 10 comet will be 3 degrees NE of galaxy Centaurus A.

On October 15, the comet has brightened to magnitude 9, but is now only 5 degrees above the southwestern evening horizon at 9pm daylight time. After this, you can follow the comet in SOHO LASCO C3 images as it enters the field of view on October 25 at 18UT (4 o'clock position) and departs at about 6UT on October 29 (2 o'clock position) https://sohodata.nascom.nasa.gov/cgi-bin/data_query

Latest information and charts (including night mode versions) can be found on my website at: http://members.westnet.com.au/mmatti/sc.htm

I encourage any members to submit photos to The Bulletin.

Variable Vagaries

by David Benn

This regular column will cover happenings in the ever-changing world of variable stars.

The plot below shows more than 33,000 observations of eta Carinae across multiple bands since 1595. The eruptive nature of this S Doradus or luminous blue variable (LBV) star is apparent from the period leading up to the month of December in 1844 when it peaked at magnitude -1, becoming one of the most prominent naked-eye objects in the southern sky, rivaling Sirius.

Observations were more frequent in the several years before the peak, presumably when it was becoming clear that something was "up" (pun intended). Observer interest has increased since.

All observations before 1971 were of course visual only. Zooming in reveals that visual observations still dominate. Regular readers of Variable Vagaries may recall that I mostly make binocular observations of eta Car from suburbia but I've also submitted a few DSLR observations and intend to do more of this. Irrespective of the band, what's clear from the light curve is that since around 1950, eta Car's magnitude has been steadily rising.

What's interesting is the change in the magnitude over the last ~70 years. By 1950, the visual magnitude was around 7 compared with about 4.5 today. It currently fluctuates by up to half a magnitude on fairly short timescales of days or weeks.

Sure, this is nothing when compared with the rise of a nova by several magnitudes over a matter of days, but that's not the point. Despite a messy light curve, the point is that we are seeing a steady rise in the most recent 7 decades.

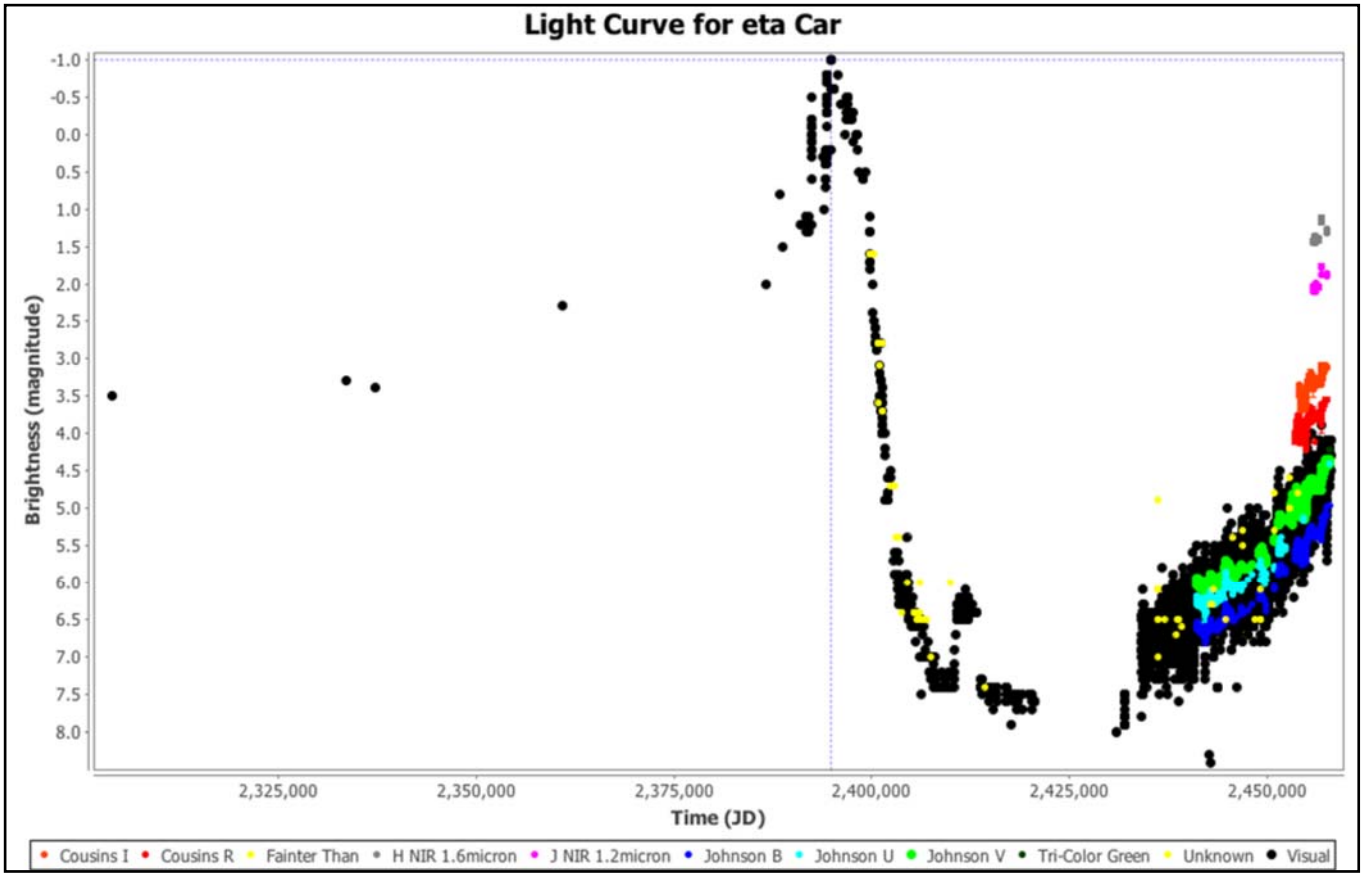
Given the low data density in the several decades before the Great Eruption in the 1840s, it's difficult to compare the slope of the trend since 1950 with that period. By early 1862, the decline was well underway, plummeting to 7.4 in 1887 before a smaller rise to 6.1 in 1891.

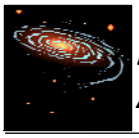
Thereafter, eta Car's magnitude dropped to around 8, due to the expulsion of about 2 solar masses of material that led to the creation of the Homunculus that still shrouds eta Car. It's not understood why eta Car is brightening across all wavelengths.

Additionally, it may be that eta Car is a binary system according to evidence from spectra and photometric observations (see AAVSO article in *Links*). It has not yet returned to the magnitude 3.5 level of 1595 and it will be interesting to see whether the upward trend continues at its current rate. As Roberta Humphreys has said (see AAVSO article in *Links*): "Eta Carinae can't brighten very much or else it will go boom" as a supernova.

Links:

AAVSO eta Car page: https://www.aavso.org/vsots_etacar
LBVs: https://en.wikipedia.org/wiki/Luminous_blue_variable





Alone in the dark

A guide to observing faint fuzzies in our night sky ***by Joe Grida***

Let's go observing near the pole

The South Celestial Pole that is!

The constellation of Octans is not really renowned for extragalactic spectacles; but there are a number of objects that would make a great target for medium to large telescopes. A quick search with AstroPlanner software, revealed at least 20 galaxies brighter than 14 mag.

Our first target is the brightest of these galaxies. Shining at magnitude 11.3, **NGC 7098** is a bright barred spiral galaxy, discovered by John Herschel on the evening of 22 September, 1835 from the Cape of Good Hope in South Africa.

At 2.6' x 4.0' in size, it will require some magnification to bring out detail. So start with about 200x. The image below left was taken with the ESO's Very Large Telescope at Paranal Observatory in Chile, so don't set your expectations up too high. In the 16" telescope, the core looks quite intense, surrounded by a much larger, fainter halo. I couldn't see any hint of the outer ring that we can see in the photo below. Perhaps, Peter McKeough's 24" or Ian Bedford's 30" may show this.

Our next target is the colliding system of **NGC 6438** and **6438A.** Situated at a declination of -85°, it is very close to the pole.

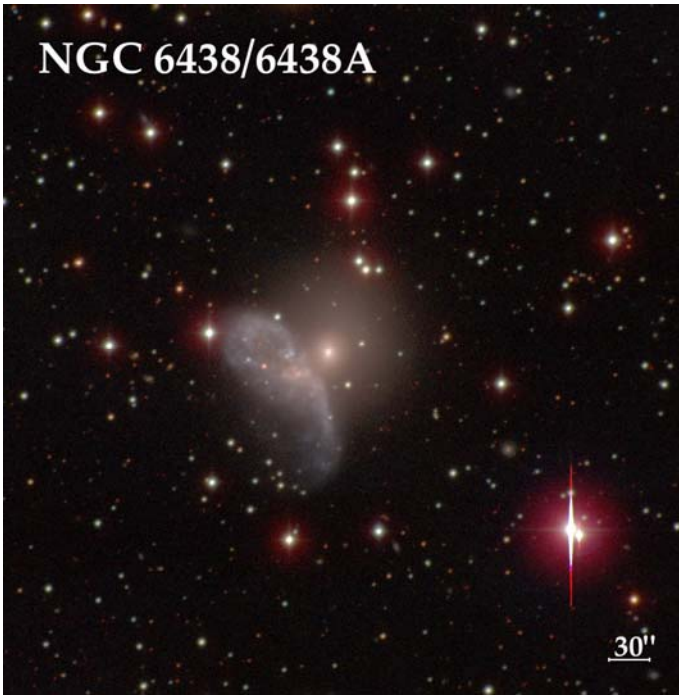
NGC 6438 is the small, bright and round galaxy in the very centre of the image below right. It shines at mag 11.1, and displays a size of 1.6' x 1.3'. The interesting object is the companion, NGC 6438A. It is a monstrous thing, an irregular galaxy or perhaps a spiral galaxy that is distorted beyond recognition. It has a small nucleus from which 2 arms emerge.

A group of researchers from the Observatorio Astronómico de Córdoba, Argentina published a paper in 1996 where they suggested that it could be a trio of galaxies undergoing a merger. Apparently rotation curves observed for the northern part of NGC 6438A are blue-shifted, whereas the southern parts are red-shifted indicating that it could be 2 disk-type galaxies caught in a fiery embrace. All the gas and dust in these objects is being squeezed causing bursts of star formation.

There doesn't seem to have been any more studies of this very peculiar object.

There's also a very nice double star that's worth visiting. Lambda Octantis (h5278) is a yellow 5.4 mag G0 primary, with a mag 7.7 blue-grey companion, at a separation of 3.1 arc-seconds.

The attraction of these objects is that they are available to you all year around. You can even wait for those still summer nights, when observing is so much more comfortable.



Above left: NGC 7098 imaged by the ESO's Very Large Telescope at Paranal Observatory in Chile.
Above right: NGC 6438/6438A image from the Carnegie-Irvine Survey of Galaxies

Contact information

Here's how to contact various members of Council, Regional Co-ordinators and SIG's

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Whyalla

The group meets on the first Thursday of the month.

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Northern Yorke Peninsula

The NYP'pers hold combined members' and public viewing nights monthly.

Coordinator: Tony Henderson
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Riverland

The Riverland group hold combined members' and public viewing nights monthly.

Co-ordinator: Tim Vivian
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Email: riverland@assa.org.au

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ASSA 125th Birthday Celebrations	*assa125@assa.org.au*	

Members' Gallery

Highlighting members' astrophotos

Above: The Lagoon (M8) and Trifid (M20) Nebulae imaged by **Trevor Green**. Skywatcher 100mmm Esprit refractor, Celestron Avx Mount, ZWO 071 Camera, 10 x 60sec unguided exposures, edited in Photoshop CC

Below: NGC 5139, the great globular cluster Omega Centauri imaged by **Colin Hill**, Gawler SA. A composite of 10 x 10min exposures, using a QHY8L One-shot-colour camera, Orion ED80 scope. Processed in PixInsight.