

The

Volume 126 No. 8

August 2017

# Bulletin

*Monthly newsletter of the  
Astronomical Society of South Australia Inc*



## In this issue:

- ◆ ASSA 125th Anniversary Dinner a great success
- ◆ Discoveries during ASSA's 5th decade
- ◆ Mary's first trip to the Alpana AstroCamp
- ◆ A dark night out with the serpent

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## 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](mailto: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](mailto: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**

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## Sister Society relationships with:

**Orange County Astronomers**

[www.ocastronomers.org](http://www.ocastronomers.org)

**Colorado Springs Astronomical Society**

[www.csastro.org](http://www.csastro.org)

**Central Arkansas Astronomical Society**

[www.caasastro.org](http://www.caasastro.org)

**Arkansas-Oklohoma Astronomical Society**

[www.aogas.org](http://www.aogas.org)

**Gruppo Astrofilii di Piacenza (Italy)**

[www.astrofilipc.it](http://www.astrofilipc.it)

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**Cover photo:** A 3 panel vertical panorama of the Milky Way taken by **Trevor Green** at Armagh, South Australia @10 p.m. on 05/08/2016. Canon 6d DSLR with a Tamron 15-30 mm f2.8 lens @f2.8 and 20 mm on a Ioptron Star Tracker. ISO 800 x 60 sec exposure.



# Activities

August 2017 - the month at a glance



## Happy Birthday, ASSA Celebrating 125 years in 2017!



### General Meeting

Wednesday, 2 August, 2017  
@ 8:00pm

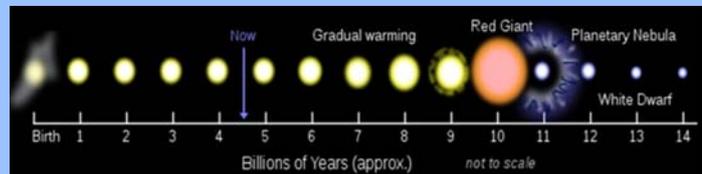
Kerr Grant Lecture Theatre  
2nd Floor, Physics Bldg  
University of Adelaide  
North Terrace, Adelaide

#### Guest Speaker:

**Colin Hill**  
Beginners' Councillor  
ASSA

### Stellar Evolution

Stars live an incredibly long time. Some will live longer than the current age of the universe but all will eventually run out of fuel and die. Tonight we will explore the life cycles of the stars. How they are born from vast clouds of dust and gas and evolve throughout their long lives as their fuel is consumed. The life cycles of stars are directly linked to their mass. Massive stars live fast and die young exploding as supernovae and seeding the universe with heavy elements. Less massive stars like the Sun will end their lives as beautiful planetary nebulae.



### 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](http://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

### August 2017 Calendar



Day	Time	Activity
Wed 2	7:00pm	Beginners' Meeting, Adelaide
Wed 2	8:00pm	General Meeting, Adelaide
Thu 3	7:30pm	Whyalla Members' Meeting
Fri 18	8:00pm	Public & Members' Viewing, NYP
Sat 19	8:00pm	Members' Viewing Night, Stockport
Sat 19	8:00pm	Members' Viewing Night, Tooperang
Fri 25	7:30pm	Astro-imaging Group, Modbury
Fri 25	8:00pm	Public Viewing Night, The Heights
Sat 26	8:00pm	Winter Star Party, Stockport
Tue 29	7:30pm	ASSA Council Meeting

**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, 2 August 2017 @ 7:00pm

Kerr Grant Lecture Theatre



### Digital Astrophotography

The ability to take stunning digital photographs of the heavens has revolutionised amateur astrophotography.



How do digital cameras work and how are those wonderful images created and processed?



# Reports and Notices

*Reports on recent ASSA activities, and notices of upcoming events*

## Guest Speaker Biography

### Colin Hill

Beginners' Councillor, ASSA



Colin is a biomedical technician working at St. Andrew's Hospital with past experience in defence electronics. He has been a member of ASSA since 1997 and has been on ASSA Council for most of that time and has held the position of Beginner's Councillor for the past 7 years.

He has conducted the ever popular Beginners' Education courses prior to the General Meeting for the last 7 years.

He also presents talks to school and special interest groups, and was a guest panellist discussing Black Holes at Science in the Pub. He also delivers astronomy presentations at the Stockport Star Parties.

He has a keen interest in astro-imaging, and operates Iris Observatory in his backyard at Gawler.

## Astro-Imaging Group Meeting

Friday 25 August 2017 @ 7:30PM

University Of The Third Age,

22 Golden Grove Rd, Modbury North

Enter via Gold Court to access Car Park 1

### Astro-Imaging Internet Resources

The Internet has become one of the most popular mediums for special interest groups to share information and experiences in their field of interest. This months meeting will be a discussion on what Forums, News Groups and Video Channels that members have found useful for information on Astro-Imaging, so bring along a list of your favourite imaging Websites to share with the members.

A 4G WiFi Internet connection and PC will be provided to display the Websites. 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](mailto:imaging@assa.org.au)

## ASSA 125th Anniversary dinner a great success!

Held on a wet and cold Saturday night, July 8 at the Belair Country Club, the party atmosphere inside was full of fun. More than 100 members, family and friends packed the venue. Our special guest, Dr David Malin, seen cutting the 125th birthday cake at right, was also inducted into the ASSA Hall of Fame.

Service Awards were also presented to Robert Bronca, Peter McKeough and Alan Brinkworth for their devoted service to the ASSA over many years.

Joe Grida also presented a short history of the Adamson Orrery, made in 1870, which is in the care of the ASSA. Thanks to Lyn Grida for the overall organisation of the night, Cate Parkinson for the invitations and door prizes, Jan Doherty for the wonderful astro-themed tea towels and hand towels, and to John Hisco for the slide show.





# History

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

## 1932-1941:

*In this decade, more members are added to the sub atomic family tree, the periodic table grows a bit and Einstein and Bohr take the occasional pot-shot at each other. For the most part though, physics takes a backseat to the mathematicians and engineers who are busy crafting the foundations of the computer age. Helicopters, radar and jet engines for aircraft make a showing in time for World War 2.*

### 1932:

Investigating sources of static that might interfere with Bell Telephone Laboratories radio transmissions Karl Guthe Jansky discovers the first radio signal from space. The faint steady hiss most intense in the direction of the centre of the Milky Way.

The Cavendish Laboratory at Cambridge has a remarkable year. With equipment held together by string and sealing wax due to expediency more than their limited budget, James Chadwick proves the existence of the neutron, John Cockcroft and Ernest Walton induce the first artificial fission reaction and the positron is discovered by Patrick Blackett and Giuseppe Occhialini though Carl Anderson at Caltech publishes first while they gather more evidence. Estonian astronomer Ernst Öpik postulates that long-period comets originate in an orbiting cloud at the edge of the Solar System.

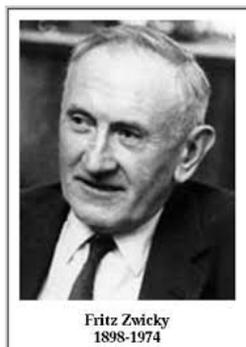
Time Dilation! The Kennedy–Thorndike experiment shows time as well as length is affected by motion. While Einstein’s belief that Quantum Mechanics was incomplete prompted ‘hidden variable’ theories such as deBroglie’s Pilot Wave theory, John von Neumann proves these theories cannot be consistent with quantum mechanics. A few years later in 1935 Grete Hermann disproves von Neumann’s proof but is largely ignored.

### 1933:

The Cavandish Laboratory at Cambridge continue to punch above its weight with Australian physicist Mark Oliphant (pictured) demonstrating the first fission reaction in a laboratory.



Having a surname scrabble aficionados would love to be able to use Fritz Zwicky finds evidence for dark matter. Using the Hooker Telescope to study the Coma Cluster of galaxies he notices the gravitational force does not balance the centrifugal force. He proposes ‘dark matter’ to account for the missing mass.



Fritz Zwicky  
1898-1974

Edward Milne names and formalizes the cosmological principle, “Viewed on a sufficiently large scale, the

properties of the universe are the same for all observers.” Sixty years later philosopher of science Karl Popper has this to say, “And the ‘cosmological principles’ were, I fear, dogmas that should not have been proposed.” And his reason, “Because I dislike making of our lack of knowledge a principle of knowing something.”

The British Interplanetary Society is founded on the 13<sup>th</sup> of October.



Enrico Fermi introduces the concept of the weak nuclear force.

Waiting for a red light on Southampton Row in Bloomsbury London, Leó Szilárd conceives the idea of the nuclear chain reaction.

### 1934:

Hideki Yukawa combines relativity and quantum theory to describe nuclear interactions by an exchange of new particles, mesons, between protons and neutrons.

Prescient in the extreme, Fritz Zwicky and Walter Baade propose a new stellar object, coin the term ‘supernova’ and hypothesize they are the transition of normal stars into neutron stars. In 2001 Stephen Maurer writes, “When researchers talk about neutron stars, dark matter, and gravitational lenses, they all start the same way: “Zwicky noticed this problem in the 1930s. Back then, nobody listened...”” Mind you, Zwicky also proposed Nuclear Goblins inside stars, moving the solar system by firing projectiles into the sun and may have been responsible for the first man made object in solar orbit when he had pellets fired from rockets in an attempt to make artificial meteors.

Richard Tolman publishes “Relativity, Thermodynamics, and Cosmology” which points toward the existence of the Cosmic Microwave Background and also shows how a closed universe could contain zero energy.

### 1935:

Albert Einstein and the Israeli physicist Nathan Rosen find a solution to Einstein’s field equations known as an Einstein-Rosen bridge, also known as a Lorentzian or Schwarzschild wormhole.

Invented by two professional musicians, Leopold Godowsky, Jr. and Leopold Mannes, Eastman Kodak markets Kodachrome colour film.



## History

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

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The Griffith Observatory in Los Angeles, California opens on May 14.



Kingsley Zipf popularises what becomes known as Zipf's Law. Given a large enough selection of natural language text such as novels or plays, the frequency of a word being used is approximately the inverse of its rank. That is the 2nd most common word will appear 1/2 as often as the most common, the 3rd most common word 1/3 as often and so on.

Einstein, Podolsky, and Rosen publish the paper, "Can Quantum-Mechanical Description of Physical Reality Be Considered Complete" arguing that the Copenhagen interpretation of quantum mechanics is not complete as it allows for, as Einstein called it, "spooky action at a distance". Bohr counters this in a paper with the exact same title.

Schrodinger's Cat is born and dies and doesn't die all at the same time. Take a cat, a flask of poison and some radioactive material. Now bung them all in a box and seal it up and you have proof positive Schrodinger never owned a cat. You also have a crystallisation of his problems with the Copenhagen interpretation which has the cat simultaneously alive and dead until the box is opened.

### **1936:**

Alan Turing submits "On Computable Numbers" to the London Mathematical Society for publication and introduces the concept of the Turing machine.

Analysing the shock waves of an earthquake near New Zealand Inge Lehmann theorises the earth has a solid inner core surrounded by a fluid outer core.

### **1937:**

Zwicky posited that galaxies could act as gravitational lenses by the previously discovered Einstein effect.

At Caltech Carl Anderson and Seth Neddermeyer discover a particle of 200 electron masses in cosmic rays. At first thought to be one of Yukawa's mesons, it was later discovered to be a muon.

The last recorded thylacine dies in Hobart Zoo and the first live giant panda, a cub named Su Lin, is brought out of China.

American engineer Grote Reber builds the first radio telescope in his backyard, as you do. The 9 metre dish takes astronomy into a whole new dimension (okay, frequency range) and Reber has the field of radio astronomy to himself for almost a decade.

June 8<sup>th</sup>, the first total solar eclipse in more than 800 years to exceed 7 minutes of totality is visible in the Pacific and Peru.

Claude Shannon's Master's thesis at MIT demonstrates that electronic application of Boolean algebra could construct and resolve any logical numerical relationship.

Konrad Zuse builds the first program controlled computer, the Z1, and submits patents in Germany anticipating von Neumann architecture.

Harlow Shapley discovers the Sculptor dwarf galaxy using the 24 inch Bruce refractor at Boyden Observatory.

### **1938:**

With the world's longest pause before an encore the coelacanth waits 66 million years to make a return just in time for Christmas. On December 23<sup>rd</sup> in East London, South Africa, Marjorie Courtenay-Latimer recognizes Captain Goosen's bizarre catch as a fish formerly only seen in fossils. Raymond Pearl demonstrates the negative health effects of tobacco smoking and joins Zwicky in the 'I told you so' club. László Bíró obtains his first patent for a ballpoint pen. Explaining how stars generate energy German physicist Hans Bethe outlines a series of nuclear fusion reactions that turn hydrogen into helium.

Otto Hahn and Lise Meitner independently discover the induced nuclear fission of uranium.

### **1939:**

Hewlett-Packard is founded as an electronics company in Palo Alto, California, on January 1<sup>st</sup>.

Robert Oppenheimer predicts the structure of neutron stars with George Volkoff and then the existence of black holes with Hartland Snyder.

Designed to solve systems of linear equations, John Atanasoff and Clifford Berry demonstrate the first prototype Atanasoff-Berry Computer at Iowa State University. Although not programmable it is the first automatic electronic digital computer.

In "Mechanization and the Record" Vannevar Bush proposes a collective memory machine with linked association trails (proto-hypertext) that would help manage information and allow scientists a sense of organization and control of their intellectual information.



# History

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

The Einstein–Szilárd letter, advising President of the United States of the potential use of uranium to construct an atomic bomb, is signed on August 2<sup>nd</sup>. World War 2 begins on September 1<sup>st</sup> and the letter is delivered on October 11<sup>th</sup>.

**1940:**

Mayall’s object (top right), the result of 2 colliding galaxies, is discovered at the Lick Observatory by Nicholas Mayall.

FM radio is demonstrated to the FCC for the first time.

Bell Labs' Complex Number Calculator, a relay-based calculator for complex numbers, is completed under the direction of George Stibitz.

Working at Oxford but hailing from Adelaide, Howard Florey and his team successfully treat mice with penicillin.

From the University of California, Berkeley, comes the discovery of radioactive isotope carbon-14, the synthesis of the rarest naturally occurring element astatine and the first 2 transuranic elements. Following uranium named after Uranus they are Neptunium and the first ever dwarf element Plutonium.

Spontaneous fission in uranium is observed by Georgy Flyorov and Konstantin Petrzhak.

**1941:**

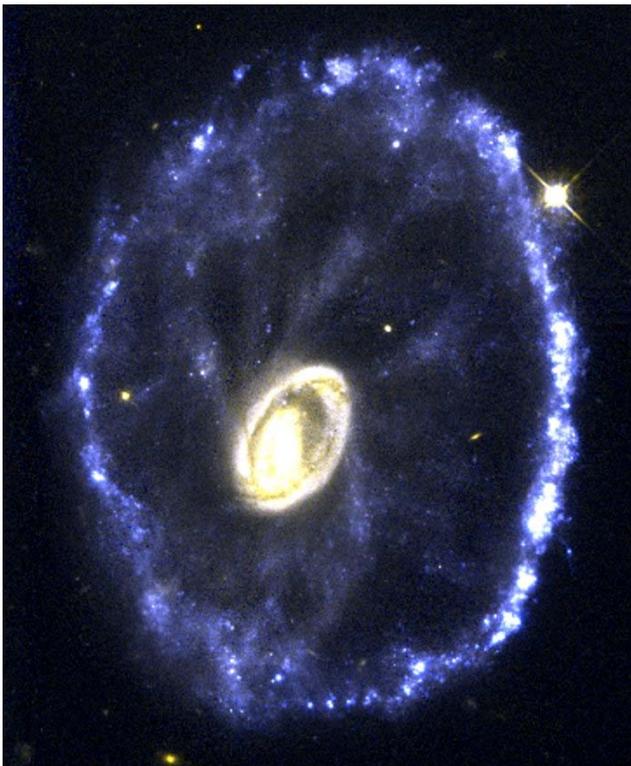
In the tradition of the Highlander and Blade trilogies Konrad Zuse’s Z2 didn’t really work. However in Berlin he presents the Z3. Performing at just over 1 FLOP it is

anything but. In fact it is the world's first working programmable, Turing complete, fully automatic computer, albeit one running at 5.3Hz, weighing 1,000kg and consuming 4kW of power. Try carrying that in your pocket and playing Candy Crush on it!



June 28<sup>th</sup>, President of the United States Franklin D. Roosevelt creates the Office of Scientific Research and Development. The office is charged with production of an atomic bomb.

Fritz Zwicky discovers the Cartwheel Galaxy (bottom left), in the constellation Sculptor. He feels it to be “one of the most complicated structures awaiting its explanation on the basis of stellar dynamics”.



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# Alpana Astrocamp

Mary Martinaitis reports on her first Alpana AstroCamp experience

Being our first time at Alpana, it was quite clear I overpacked on...well, everything! Way too many clothes, a lot of linen, an exorbitant amount of food; enough to feed a third world country – plus a husband and a child. All jokes aside, Paul and Blake were the best companions throughout this trip.

Mainly to mitigate some of the kangaroo danger, we did the trip with a stop-over in Quorn. What a lovely quaint little place. Great pub too, and only a walk away from where we stayed at the old Mill Motel. Blake thoroughly enjoyed having a room with a bunk bed he could climb up and down most of the night like a little monkey.

When we turned left from the main road onto Alpana station I really didn't know what to expect. When Paul said we'll be staying in Shearers quarters, I automatically assumed a shed made from wood with a deep seedy sheep smell and lanolin lined walls. I was pleasantly surprised with the all concrete rooms and bathroom facilities.

Gentle giant Paul Rogers and the boisterous Grant White greeted us warmly and showed us to our allocated room seven and around the building we were going to use over the next few days. As we were getting acquainted with room seven and Blake helping without really helping at all, a sweet man with a white beard and a zeal for life, came up to us and suggested we stay in room one with the bunk bed for Blake. We asked everyone else there if it was ok to use room one and before we knew it, Blake made himself at home on the top bunk bed. Thanks Allan, we appreciated that suggestion very much, and thanks to everyone else who didn't mind us using room one.

The only down side to room one was that dreaded cold dark walk to the loo at three am, but I wasn't alone, nope, there were giant moths too!! These giant moths apparently would bite you and lay larvae where-ever they bit you and when they hatched they would consume you...well that's what Dean told me right before bedtime. He put me right at ease.

Paul was quick to set up his twelve inch telescope ready for the first amazing clear sky and darkness that was not far behind.

***Nothing really prepared me for how spectacular this night sky turned out to be. Not only could you see the brilliance of the Milky Way but the stars looked close enough to reach out and grab. I spent most of my time just looking at the sky, making a wish at the occasional falling star.***

Blake really wanted to look at Saturn, so we geared up and headed out to see Paul. Unfortunately, Paul was having some technical difficulties; his mount moving his telescope around like a thing possessed because his tablet could not



cope with the cold. He wasn't the only one having problems though. I believe someone's finder scope had an issue too. With these issues causing light banter amongst the group Paul did manage to show me my favourites before bed time. Saturn made Blake very happy and I got to see the Tarantula nebula. That nebula never fails to send chills down my spine. Whenever I see that nebula, I always imagine a giant space spider lying in wait telepathically luring you into its lair...foreboding, yet spectacular.

Paul stayed out till two or three in the morning and the only reason I knew that was because he had a minor bingle with the bunk bed he tried to slip under in the dark. Ouch.

Friday morning was a gathering of great minds in the common room and a sleep in for others. Grant was bird watching in his Pyjamas with a pair of binoculars and Dean took apart his finders scope. There was a lot of toothpaste on the table? Paul Rogers told us a story about gathering toothpaste samples from his local dentist every visit. I'm still unclear about the need for toothpaste with telescopes but as I always say...healthy teeth, healthy heart!

Blake wanted to do some climbing so we went for a little adventure through the creek, around the shearers shed and took the long way back. Blake chose a great spot for climbing in the creek which he aptly named Ant Mountain. He also found an interesting rock collection. I think I accidentally (on purpose) lost some before we left on Monday morning.

Friday was a great learning day for me, it was also the day a mysterious pair of jocks and long johns showed up. I learnt a little more about the people, their personalities and their love for astronomy. Alan Brinkworth was one of my favourites. His knowledge and stories were amazing. I also learnt how much sugar was in each of my food products, an eye opener to say the least.

Grant was Blake's favourite. He left an impression of great admiration on him and would follow Grant anywhere. Grant even took Blake for a walk around the station and in his car on Sunday to pick up our flat tyre from Angorichina after we took the Mitsubishi Magna four-wheel driving on Saturday



# Alpana Astrocamp

*Mary Martinaitis reports on her first Alpana AstroCamp experience*

through Brachina Gorge. Thanks Grant for looking after Blake and keeping an eye on him, he still talks about you.

Barry kept the fire going for us in the common room, keeping us all nice and toasty. Thanks Barry, especially for showing me how to light the grill. I'm glad those little hotties (hand warmers) worked out for you.

Dean was great also, a walking encyclopaedia and full of useful information about our environment. When he suggested Brachina Gorge, he also included its history, how we should approach it and to look out for the yellow footed rock wallabies. Which we didn't see! Not one popped out for us. We came across emus, kangaroos, a giant echidna, goats and an eagle, but not one yellow footed rock wallaby. I can't help but feel like we let Dean down somehow. Thank you Dean, Brachina gorge was amazing! Blake did a lot of climbing there too and he was very useful at changing a spare tyre, little trunk monkey.

Peter Maunder was great to have around too. He is intelligent, quiet and refined. His detailed knowledge on how things worked was mind boggling and he loves his Toyota Prado. Did you know his Prado has climate control in both front and back! I can start a tsunami in my car, especially when my mum is in it. Thank you Peter, I can't wait to catch up with you again and maybe get a look inside the Prado. Friday was also the day more people arrived and a good thing too, the nights viewing looked like another good one. The lovely Phil Fitzpatrick turned up and also the amazing Jan and John Cooper with their tales of their flying machine and great adventures. More people turned up for viewing as just visitors and friends of friends which made the evenings very pleasant especially cheese and wine afternoon.

The ground shook and Ben Hur's trumpets sounded when the base station rocked up. As soon as the command and control centre was in place, Peter McKoeugh wasted no time setting up his telescope. It truly was a spectacular sight to see three 18 inch telescopes sharing the ground.

The dark skies on Friday did not disappoint. Blake went to

bed instead of coming out again after a few episodes of Doctor Who and I was very pleased to see Paul happy that his equipment was in better working order. Paul showed me some great views some of which included the Lagoon nebula, the Sombrero galaxy (M104), the Trifid nebula, NGC 4565 galaxy, and M83. We also enjoyed just moving along Markarian's Chain and viewing the many galaxies along the way.

An unexpected highlight was M51 (the Whirlpool galaxy). The latitude of Alpana being around 4 degrees less than Adelaide, means that M51 was around 7 degrees above the horizon. Still low, but with the clear Flinders air, it was surprisingly bright as was its companion. The spiral arms were not apparent at this altitude, but there was definite mottling in the disk which would correspond to dark areas between the arms.

Viewing continued into early morning again and everyone seemed very pleased on Saturday morning about what they had viewed. The mysterious long johns and jocks appeared outside on the BBQ area this time. I don't think they belonged to anyone from the astro camp and I don't think anyone would own up to them regardless, especially since they were found out in the wilderness of Alpana station. We decided to see Brachina gorge and its amazing rock formations we even stopped on the track on the way out to Parachilna to see Grant head in. It was the road from Parachilna to Blinman where we ended up with a flat tyre. We got back in time for the afternoon gathering of wine and cheese which I supplied an abundance of over packing and all. It was nice to sit and enjoy everyone's company. The only thing missing was the table cloth.

By the afternoon the wind started to pick up. What started as a gentle cold breeze turned into a gust and Saturday night was cut short. By midnight most people had packed up and enjoyed more wine and cheese as the clouds rolled in.

Sunday morning was relaxed and most people were packing up ready to head off on Monday morning. The mysterious long johns and Jocks had made a pleasant appearance in the common room on the table even! It could have been the crabs making them move about so much? Let's just say they ended up where they truly needed to be – the bin!

Sunday night however was very colourful. There were shits and giggles and everyone partook in various wine and spirit tastings that made the night very jovial. Alpana made a lasting impression on myself and my family. The people were amazing and what a wonderful atmosphere. We have even decided to return for the August astro camp. Thanks Joe, for organising, we appreciated it.

**Credit:** Photos by Paul Martinaitis





## Moon orbits third largest dwarf planet in our solar system

**The combined power of three space observatories, including NASA's Hubble Space Telescope, has helped astronomers uncover a moon orbiting the third largest dwarf planet, catalogued as 2007 OR10. The pair resides in the frigid outskirts of our solar system called the Kuiper Belt, a realm of icy debris left over from our solar system's formation 4.6 billion years ago.**

With this discovery, most of the known dwarf planets in the Kuiper Belt larger than 600 miles across have companions. These bodies provide insight into how moons formed in the young solar system.

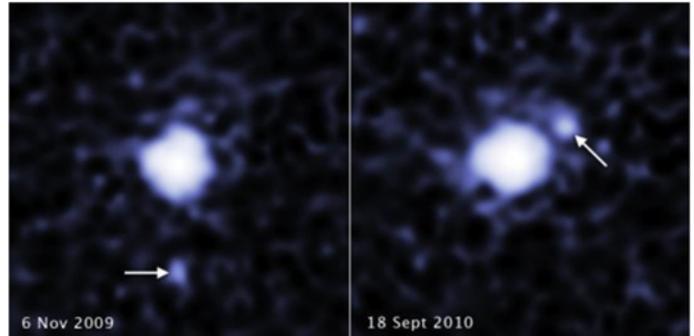
"The discovery of satellites around all of the known large dwarf planets -- except for Sedna -- means that at the time these bodies formed billions of years ago, collisions must have been more frequent, and that's a constraint on the formation models," said Csaba Kiss of the Konkoly Observatory in Budapest, Hungary. He is the lead author of the science paper announcing the moon's discovery. "If there were frequent collisions, then it was quite easy to form these satellites."

The objects most likely slammed into each other more often because they inhabited a crowded region. "There must have been a fairly high density of objects, and some of them were massive bodies that were perturbing the orbits of smaller bodies," said team member John Stansberry of the Space Telescope Science Institute in Baltimore, Maryland. "This gravitational stirring may have nudged the bodies out of their orbits and increased their relative velocities, which may have resulted in collisions."

But the speed of the colliding objects could not have been too fast or too slow, according to the astronomers. If the impact velocity was too fast, the smash-up would have created lots of debris that could have escaped from the system; too slow and the collision would have produced only an impact crater.

Collisions in the asteroid belt, for example, are destructive because objects are traveling fast when they smash together. The asteroid belt is a region of rocky debris between the orbits of Mars and the gas giant Jupiter. Jupiter's powerful gravity speeds up the orbits of asteroids, generating violent impacts.

The team uncovered the moon in archival images of 2007 OR10 taken by Hubble's Wide Field Camera 3. Observations taken of the dwarf planet by NASA's Kepler Space Telescope first tipped off the astronomers of the possibility of a moon circling it. Kepler revealed that 2007 OR10 has a slow rotation period of 45 hours. "Typical rotation periods for Kuiper Belt Objects are under 24 hours," Kiss said. "We



**Above:** These two images, taken a year apart, reveal a moon orbiting the dwarf planet 2007 OR10. Credit: NASA, ESA, C. Kiss (Konkoly Observatory), and J. Stansberry (STScI)

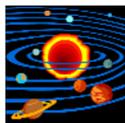
looked in the Hubble archive because the slower rotation period could have been caused by the gravitational tug of a moon. The initial investigator missed the moon in the Hubble images because it is very faint."

The astronomers spotted the moon in two separate Hubble observations spaced a year apart. The images show that the moon is gravitationally bound to 2007 OR10 because it moves with the dwarf planet, as seen against a background of stars. However, the two observations did not provide enough information for the astronomers to determine an orbit.

"Ironically, because we don't know the orbit, the link between the satellite and the slow rotation rate is unclear," Stansberry said. The astronomers calculated the diameters of both objects based on observations in far-infrared light by the Herschel Space Observatory, which measured the thermal emission of the distant worlds. The dwarf planet is about 950 miles across, and the moon is estimated to be 150 miles to 250 miles in diameter. 2007 OR10, like Pluto, follows an eccentric orbit, but it is currently three times farther than Pluto is from the sun.

2007 OR10 is a member of an exclusive club of nine dwarf planets. Of those bodies, only Pluto and Eris are larger than 2007 OR10. It was discovered in 2007 by astronomers Meg Schwamb, Mike Brown, and David Rabinowitz as part of a survey to search for distant solar system bodies using the Samuel Oschin Telescope at the Palomar Observatory in California.

**Story Source:** NASA/Goddard Space Flight Centre. "Moon orbits third largest dwarf planet in our solar system." 18 May 2017. [www.sciencedaily.com/releases/2017/05/170518140249.htm](http://www.sciencedaily.com/releases/2017/05/170518140249.htm)



# Solar System Highlights

## The major planets during August 2017

by John Newell

On the 1st the **Sun** will rise at 7:12am and set at 5:30pm, on the 31st it will rise at 6:40am and set at 5:53pm (Subtract 4 minutes per degree East of Adelaide and add 4 minutes for each degree West.) The solar eclipse visible from the USA on the 21st will not be visible from here.

The **Moon** will be full at 3:42am on the 8th during a partial lunar eclipse, the Moon one quarter immersed in the Earth's shadow just nine minutes later. Last quarter will be on the 15th, New moon on the 22nd at 4:01am and First quarter on the 29th.

**Mercury** will set at 7:42pm on the first, will be at Inferior Conjunction on the 27th and will rise at 6:08am on the 31st.

**Venus** will rise at 4:44am on the first, will rise with the Moon on the 19th and will rise at 5:07am on the 31st.

**Mars** will rise with the Sun on the first, will reach apogee on the 5th and will rise at 6:16am on the 31st. The Curiosity rover is now making its way up Mount Sharp, approaching the Vera Rubin hematite ridge. It has battered wheels and a wonky drill but is otherwise in good condition, finding geological evidence that Mars was wet and habitable 3.5 billion years ago, like the early Earth.

**Ceres** magnitude 8.4 in Gemini, will rise at 5:32am on the first, will rise with the Moon and Venus on the 19th and will rise at 4:26am on the 31st.

**Jupiter** in Virgo, sets at 10:53pm on the first, sets with the Moon and Spica on the 25th and sets at 9:19pm on the 31st.

**Saturn** passing Scorpius, sets at 4:05am on the first. It will set with the Moon on the 4th as well as the 31st when it will dip below the horizon at 2:05am.

**Uranus** magnitude 6.1 in Pisces, rises at 11:52pm on the first, rises with the Moon on the 12th and rises at 9:52pm on the 31st.

**Neptune** magnitude 7.6 in Aquarius, rises at 8:17pm on the first, rises with the Moon on the 9th and rises at 6:15pm on the 31st.

**Pluto** magnitude 14.2 in Sagittarius, sets at 5:55am on the first, sets with the Moon on the 6th and sets at 3:55am on the 31st.



### Diary of phenomena

#### August 2017

d	h(UT)		
2	18	Moon at apogee	
3	7	Saturn 3.4°S of Moon	
3	9	Uranus stationary	
4	18	Moon furthest South (-19.4°)	
7	18	<b>FULL MOON</b>	<b>Eclipse</b>
9	23	Neptune 0.8°N of Moon	
12	5	Mercury stationary	
15	1	<b>LAST QUARTER</b>	
16	6	Aldebaran 0.4°S of Moon	
18	6	Moon furthest North (19.4°)	
18	13	Moon at perigee	
19	4	Venus 2.2°N of Moon	
21	3	Mars 1.5°N of Moon	
21	18	<b>NEW MOON</b>	<b>Eclipse</b>
21	20	Regulus 0.1°S of Moon	
22	9	Mercury 5.8°S of Moon	
25	14	Saturn stationary	
25	15	Jupiter 3.3°S of Moon	
26	21	Mercury inferior conjunction	
29	8	<b>FIRST QUARTER</b>	
30	10	Moon at apogee	
30	14	Saturn 3.5°S of Moon	

### Partial Eclipse of the Moon - 8 August 2017

Magnitude of eclipse	<b>0.25</b>
Penumbral eclipse begins	<b>1:18am</b>
Umbral eclipse begins	<b>2:52am</b>
Mid-eclipse	<b>3:51am</b>
Umbral eclipse ends	<b>4:49am</b>
Penumbral eclipse ends	<b>6:23am</b>



The image at top right shows the view from the Moon at maximum eclipse.

### Moon Phases - August 2017

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
		1 Age: 9.1 days	2 Age: 10.0 days	3 Age: 10.9 days	4 Age: 11.8 days	5 Age: 12.7 days
6 Age: 13.6 days	7 Age: 14.6 days	8 Age: 15.5 days	9 Age: 16.5 days	10 Age: 17.5 days	11 Age: 18.5 days	12 Age: 19.5 days
13 Age: 20.5 days	14 Age: 21.6 days	15 Age: 22.7 days	16 Age: 23.8 days	17 Age: 24.8 days	18 Age: 26.0 days	19 Age: 27.1 days
20 Age: 28.2 days	21 Age: 29.3 days	22 Age: 0.8 days	23 Age: 1.9 days	24 Age: 2.9 days	25 Age: 3.9 days	26 Age: 4.8 days
27 Age: 5.8 days	28 Age: 6.7 days	29 Age: 7.6 days	30 Age: 8.4 days	31 Age: 9.3 days		



## Two nicely placed comets for southern observation

### **C/2015 V2 Johnson**

Closest to Earth on 2017 June 5 at 0.81AU.

Closest to Sun on 2017 June 12 at 1.63AU.

Maximum magnitude 7 in June 2017.

Orbital period: N/A (parabolic.)

During August, Comet Johnson will be perfectly situated overhead as it treks southwards during evening hours. At the start of August, the magnitude 8.5 comet will be located in Centaurus, about 6 degrees NE of Theta Cen, although moonlight will interfere.

The first opportunity for dark sky viewing occurs on the evening of August 10. No bright stars in this vicinity will make spotting the comet a challenge, but it should be visible in binoculars from a dark sky site.

Between August 23rd-25th, the comet will be situated less than 1 degree from Kappa Cen and magnitude 12 spiral galaxy NGC 5786.

On the 26th, the now magnitude 9.3 comet moves into Lupus, and moonlight once again interferes.

Comet Johnson should appear quite condensed through telescopes, sporting a dust tail.

### **71P Clark**

Discovered by a New Zealander in 1973, Comet Clark is having a highly favourable apparition.

It was 1.58AU from the Sun on June 30 and situated at opposition, 0.59AU from the Earth.

The comet has a tendency to become brighter after perihelion, like many of the short period comets do. So during August, the comet should still shine at magnitude 10, situated in Scorpius and best viewed after full moon, from August 10.

On this date the comet will be 30' south of the Bug Nebula NGC6302, astrophotographers take note.

On August 18, it will be 30' south of Upsilon Sco. On the 22nd, it will be less than 1 degree south of star cluster NGC 6400. On the 27th, it will be about 30' south of globular cluster NGC 6441. After this date, moonlight will once again start to interfere.

### **C/2017 K2 PANSTARRS update**

Was discovered on May 21 at a whopping distance of 16 AU, a near record distance for a comet discovery, and nearly out to the orbit of Uranus.



**Above:** Comet C/2015 V2 Johnson imaged by Justin Tilbrook on 10 July 2017. Cropped image. It displays a 33.5 arc minute long tail. North is at top.

Currently shining at magnitude 19 would imply a very large comet (absolute magnitude of 1) Unfortunately the perihelion date will occur in December 2022, when the comet is near conjunction, 1.8AU from the Sun.

It will be quite distant from the Earth and Sun and not likely to become brighter than magnitude 5. The other bit of bad news is that the comet may be dynamically new (first approach to the Sun) thus experiencing abnormally high activity at the moment.

Potentially this comet may not even become visible to the naked eye!

The positive news is that it will be a highly favourable southern comet, situated deep in southern evening skies.

Latest information and charts (including night mode versions) can be found on my website at:

<http://members.westnet.com.au/mmatti/sc.htm>



# Variable Vagaries

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

by David Benn



For the last few weeks, I've been supporting the instructor (Brad Walter) of a new data analysis AAVSO CHOICE course that uses VStar as the primary tool, learning a lot in the process and getting more direction for future development.

Last month I mentioned a request for observations by astronomers at the University of Wroclaw in Poland of the bright long period eclipsing binary **HD 148703** (aka **N Sco**, **HR 6143**) that was expected to undergo primary and secondary eclipses on June 11 and 14. I said I'd taken pre-eclipse images but cloud prevented me from imaging the primary eclipse but that I hoped to record the secondary eclipse. Cloud prevented that too. So, while I didn't submit any observations myself, around 100 visual and 80 Johnson V & B observations were submitted by others. There does not appear to be enough data in AID to determine a period yet though.

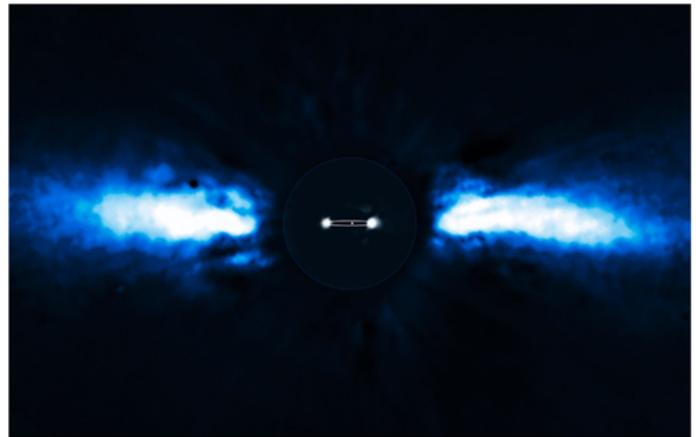
AAVSO recently released a web-based target planning tool (see *Links*) that provides information about variable stars from any location that are in need of observation. Other than when a star was last observed, how often it *should* be observed, the RA & Dec, constellation, variable type, magnitude range and period (if known), you can also find out whether it is associated with a particular alert or campaign.

In this way I recently found that observations were being requested for Beta Pictoris in relation to Alert Notice 566 and that no observations exist in AID:

*The BRiGht Target Explorer-Constellation (BRITE-Constellation) satellite suite is obtaining high-precision photometry of selected very bright...stars. Its purpose is to investigate the "stellar structure and evolution of the brightest stars in the sky and their interaction with the local environment."*

Specifically re: Beta Pictoris:

*The delta Scuti star beta Pic (NSV 16683) (3.80-3.86V) is one of the BRITE stars being focused on during this season. Bet Pic is particularly interesting now because a transit of the star's planet's Hill sphere (the region around a planet in which it dominates the attraction of satellites) is predicted to occur during 2017-2018. Ongoing observations beginning now are valuable to establish a baseline prior to the transit.*



Beta Pictoris (source: <https://cdn.eso.org/images/screen/eso1024a.jpg>)

I wish the target tool had been available early this year when Alert Notice 566 was created and Beta Pictoris was higher in the sky after sunset. Not to worry. Given that the star has a period of 0.02626 days (about 38 minutes) I took images every minute for an hour on June 21. This is a bright star with a magnitude range of 3.8 to 3.86 with a dust disk and exoplanet. Given how low in the sky the target was, even more so by the time the end of the hour, the SNR wasn't great so, I'm not submitting the data. I seem to be saying that a lot lately.

AAVSO's Stellar News Feed (see *Links*) currently has articles about an alternative hypothesis for the magnitude dips in Tabby's Star and a new class of pulsating variables: blue large-amplitude pulsators. See *Links*.

There have been forum discussions about arguments for and against a possible name change for AAVSO, taking the "American" out of AAVSO and making it more "international". It is already in practice though and I agree with those who say it's not worth getting too worked up about (including a certain other ASSA+AAVSO member). It's a bit like saying that we should take the "SA" out of ASSA because we have interstate members (which I believe we do). There's also an involved thread regarding ways in which to improve the quality of submitted photometry data. See *Links*.

## LINKS:

AAVSO Target Tool: <https://www.aavso.org/aavso-target-tool>

Beta Pictoris: <https://www.aavso.org/aavso-alert-notice-566>  
<http://www.eso.org/public/news/eso1024>

AAVSO Stellar News Feed

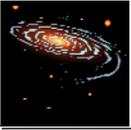
<https://www.aavso.org/another-possibility-tabby's-star-dips>

<https://www.aavso.org/blue-large-amplitude-pulsators-blaps-new-class-variable-stars>

AAVSO forum topics

<https://www.aavso.org/seeking-input-proposals-change-aavsos-name>

<https://www.aavso.org/vis-v-v>



# Alone in the dark

*A guide to observing faint fuzzies in our night sky*

*by Joe Grida*



## A dark night outing with a serpent

You'll need a dark night and transparent skies to make the most of our target objects this month. They cross the meridian at approx. 40° altitude in the northern sky early in the evening.

Serpens is probably better known for the magnificent globular cluster M5 or the exotic ring galaxy known as Hoag's Object. If you don't know this one, just google it.

The interacting galaxy pair of NGC 5953 and NGC 5954 are in our sights on this outing. And, we'll make a couple of others as well.

NGC 5953/5954 are located at RA: 15:34:32, and DEC +15:11:39. Both galaxies were discovered by William Herschel in 1784, and both are classified as spiral galaxies, at a distance of approximately 90 million light years.

Astronomer Halton Arp also included them in his Atlas of Peculiar Galaxies in 1966. A total of 338 galaxies are presented in the atlas.

Observing these two is not for the faint-hearted. It's not the brightness that is the problem, but their small size. Both galaxies are of magnitude 12, but NGC 5953 is only 1.6' x

1.3', whilst NGC 5954 is only 1.1' x 0.5'. Once you have located them, switch to the highest power that the observing conditions will allow; that is the key to detecting any details in the pair.

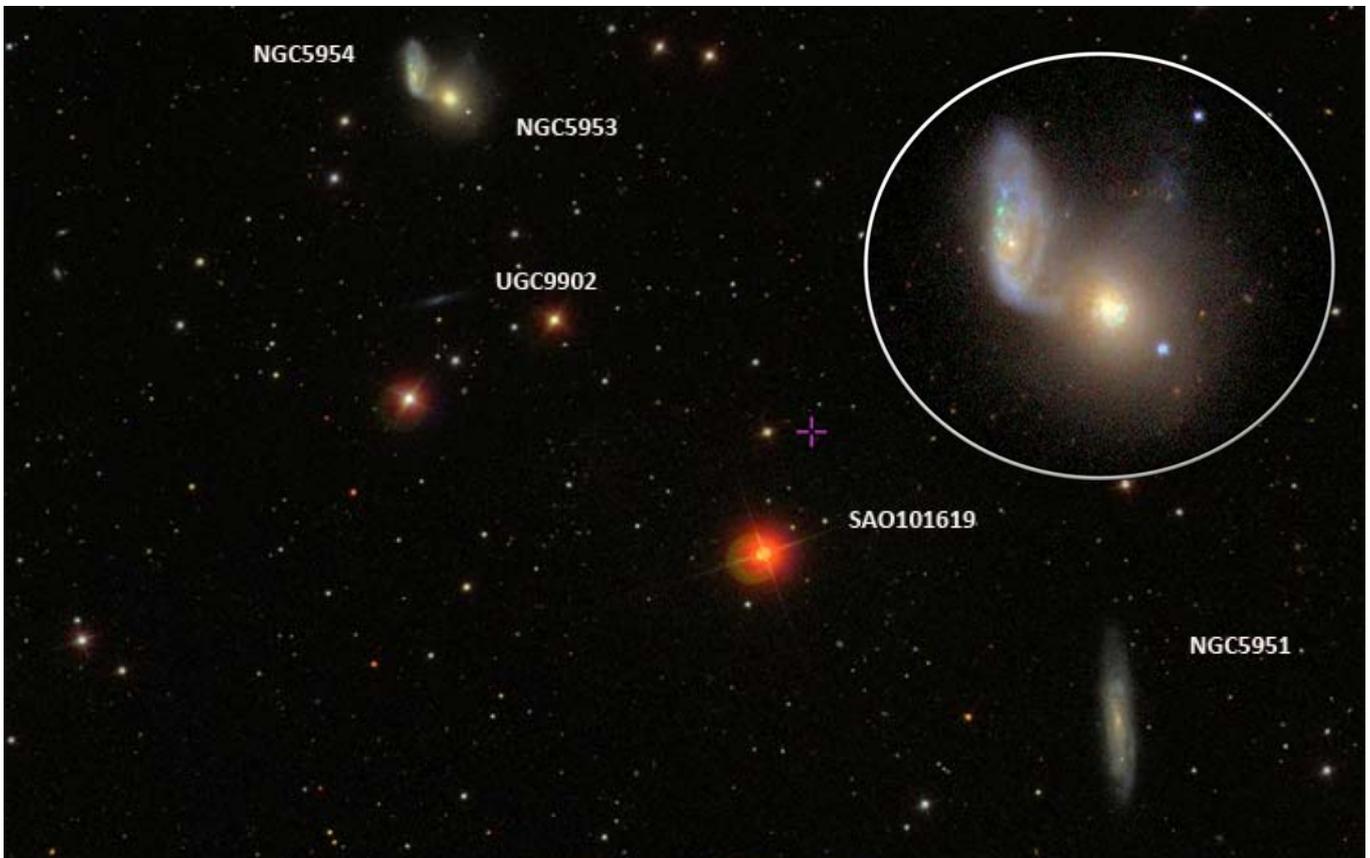
NGC 5953 is a Seyfert 2 type and hosts an active galactic nucleus (AGN). The combination of an AGN and the interaction results in massive star formation and the inset clearly shows a tidal bridge between the two.

Those with a larger telescope (like Peter McKeough's new 24") should also aim to spot the edge-on UGC 9902 3.8' to the south. Use the mag 10.1 & 11.3 stars as gate-posts to help you locate the galaxy.

When you've seen these 3, then switch back to a lower power eyepiece, and include the edge-on spiral NGC 5951 in the same field. It's only 16' to the south-west of the pair.

And don't make the mistake that this is really eye-candy compared to the last three. Its larger size 0.8' x 3.6' at mag 12.9 translates to a surface brightness of 13.8! Difficult, but achievable in mid-sized scopes.

You still want eye-candy? Go see M5!



**Above:** The starfield showing all 4 galaxies mentioned in the article above. Aladin Sky Atlas image from the Sloan Digital Sky Survey. The inset shows a closeup of ARP 91 (NGC 5953/5954).



# Contact information

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

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**Note: To address all members of the ASSA Council, send email to: [council@assa.org.au](mailto:council@assa.org.au)**

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### Whyalla

The group meets on the first Thursday of the month.

Coordinator: Peter Mayfield

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Email: [whyalla@assa.org.au](mailto:whyalla@assa.org.au)

### Northern Yorke Peninsula

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

Coordinator: Tony Henderson

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Email: [nyp@assa.org.au](mailto:nyp@assa.org.au)

### Riverland

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

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Email: [riverland@assa.org.au](mailto:riverland@assa.org.au)

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**Variable Stars** David Benn 0407 261163

**Radio Astronomy** Peter Gray 0418 829 632

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**ASSA 125th Birthday Celebrations** [assa125@assa.org.au](mailto:assa125@assa.org.au)



## Members' Gallery

*Highlighting members' astrophotos*

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**Above:** NGC3372, the Eta Carina Nebula, imaged by **Jamie Presser** in Hydrogen Alpha @ Bendleby Ranges, May 2017. Skywatcher ED80 telescope, Skywatcher HEQ5 pro mount, QHY9-M CCD Camera. Exposure: 6 x 10 min subs (3600 sec total). Processed in CCDStack2 and Photoshop.

**Below:** The ringed planet, Saturn, imaged by **Gerard O'Born** using a 10" GoTo Dobsonian, ASI120MC-S colour camera, AutoStakkert2, Registax post processing, Photoshop.

