

# Astro Flyer

**JULY 2019**



## Club News

Hello All,

We have two very important people of the club not renewing their positions for 2019 - 2020 at the AGM. These positions are needed for the club to function.

I am ready to relinquish the Presidency so I can take on the Secretary/ Treasurer position.

That means we need a new President and Vice President. The President runs the meeting and the VP runs the meeting if the President is not there. Pretty easy.

I would not like to see the club fold because we can't have a President and VP.

Think hard on this and please email me if you would consider taking these positions.

Time is running out.

As I said before the AGM is coming up. I will hold a free President's BBQ for members. Visitors can pay \$1.50 per sausage sandwich (cheap). These will be available just outside the entrance to the club's meeting venue at the Wollongong Uni, Shoalhaven branch, George Evans Road, Mundamia.

**The future of the club is in your hands.**

**Frank Gross (2019)**

**Next monthly meeting will be held at the Shoalhaven Campus of the Uni of W'Gong, George Evans Road off Yawal Road, West Nowra, July 19th, 6.30 pm for 7pm start.**

### Contents

*Out There' and  
Viewing Nights  
Bob Turnbull Page 2-3*

*Sky Objects Eugene  
O'Connor  
Pages 4-6*

*Astro Events Frank  
Gross Pages 7-12*

*Lunar Craters by Harry  
Roberts Pages 13-14*



### MOON PHASES



**New Moon   First Quarter   Full Moon   Last Quarter**  
**Aug 1st   Aug 8   July 17   July 25**

### Viewing Nights

Club viewing nights are selected to provide viewers with the best possible conditions for good viewing. They are held on specific Saturdays at different locations around Nowra.

The next club viewing night will be on **Saturday 27 July (back-up night Sun 28 July)** at Nowra University Campus

*More Club Information  
Page 15*

## **OUT THERE**

### **Bob Turnbull OBSERVATION OFFICER**

#### **OUT THERE AUGUST- SEPTEMBER**

Hi all, I'm hoping you have been getting some good viewing nights lately and getting out about 6 pm to see what's about before it gets too cold.

I spent a couple of hours out at Woncor road viewing site, the evening after our last meeting and found it was clear and cold ( when a light southerly breeze wafted through my elderly bones)

Viewing was very good and it was a shame that the only other members who came (Frank and Kevin) had left Woncor road about half an hour before I arrived at five past 7 pm !

I hope you are watching Brian Cox on his new TV program about the Planets, I really will be great if he's presenting it.

I was impressed with the presentation of our new member's regarding his viewing objects, I hope they will appear in this issue of the Astro Flyer.

#### **CONSTELLATIONS**

August is the time for the Tea pot in Sagittarius to pass overhead and is ideal to view our 180 degrees of our galaxy with its central bulge and the EMU. Good viewings can also be made of the Crux, False Cross, Carina and Vela. Scorpio is also a must with its various feature from head to tail.

#### **PLANETS**

MERCURY reaches its greatest elongation of the Sun with a magnitude of diameter of 7.5" and rapidly fades by the end of August to diameter 5.1". However in September it remains of a slightly larger apparent diameter but 30<sup>th</sup> of October it is 8.2".

VENUS is too close to the SUN until mid-September, but returns to the early morning sky until May 2020.

MARS we'll have to wait until the early morning sky in November for the red planets next appearance.

JUPITER is in Ophiuchus, and will be overhead at 7:30pm mid-month, at diameter 41.0" and magnitude -2.3

#### **GALAXIES**

Refer to the comprehensive list on page 53 of your Astronomy 2019 for details of a large list of these to fill in your viewing nights.

Clear skies and good viewing  
BOB TURNBULL

## VIEWING NIGHTS

Club/Social Viewing Nights are on Saturday evenings "just" Before Sunset. Viewing nights are for members and invited guests. The contingency plan for poor weather on the proposed viewing night is to meet the next night (a Sunday night) .

**Woncur Road**, South Nowra (Head South down The Princes Highway, turn right at BTU Road, Woncur Road is the street first on the left).

**University Viewing site.** On the way to the university on George Evans Road go straight ahead through the second turning circle to the new viewing site.

### SHOALHAVEN ASTRONOMERS SUGGESTED VIEWING NIGHTS

**JUNE to DECEMBER 2019**

JULY 27th	NOWRA UNIVERSITY CAMPUS	6 PM TO 8 PM
AUGUST 10th	WONCUR ROAD	6 PM TO 8 PM
SEPTEMBER 21st	NOWRA UNIVERSITY CAMPUS	6 PM TO 8 PM
OCTOBER 5th	MEMBERS HOME CHOICE	6 30 PM TO 8:30 PM
NOVEMBER 2nd	WONCUR ROAD	6 45 PM TO 9:00 PM
DECEMBER	TO BE ARRANGED AS REQUIRED (OPTIONAL)	

Bring your scopes and or binoculars and a small folding chair, a decision on the day planned, depending on viewing conditions, by the club president and his deputy.

Email information if details are changed, to all, or contact Frank for changes.

Solar viewing BBQ lunches (BYO) may be held and these will be advised ahead of these events. Special events such as Comets, eclipses etc. may also warrant members night viewings.

Bob Turnbull  
OBSERVATION OFFICER

### The Visual Astronomer Part 8

*Eugene O'Connor*

#### **Zubeneschamali: The Hunt for a Green Star!**

*As we search stars, near and far we are aware of two important facts: Stars come in a variety of colours, often contrasting in superb double stars; green stars for some reason are missing!*

*This topic has been long debated by the visual astronomers and when you research it, put simply it is to do, not with the colours of stars, but with the way we observe the visual spectrum and the way our eyes perceive colour. The conclusion seems to be that green because of its position as centre of the visual spectrum is not a colour our eyes perceive in stars. Having said that I know that even the most experienced visual astronomers have made a note of stars that seem somewhat green. I hope to offer a simple explanation for the lingering reports on green stars before the end of this article.*



### The Green Double Star

Those who have even taken a passing interest in double stars will know that Antares, the massive mag 1 Red Giant star or Alpha Scorpio has a close mag 7 companion often seen as green in colour. I have witnessed this lime green colour using the trick of observing Scorpio in fading day light with both a 12" and 16" scope. However, the green companion becomes white or bluish when spotted in the darkened night sky. The updated version of Hartung's famous 'Handbook for Southern Observers' suggests that Hartung and other early observers felt the green colour was a trick of the eye, saturated by the deep Orange/Red of Antares. This has also been shown when Antares is occulted by the moon and its companion star emerges first.

Cont...2

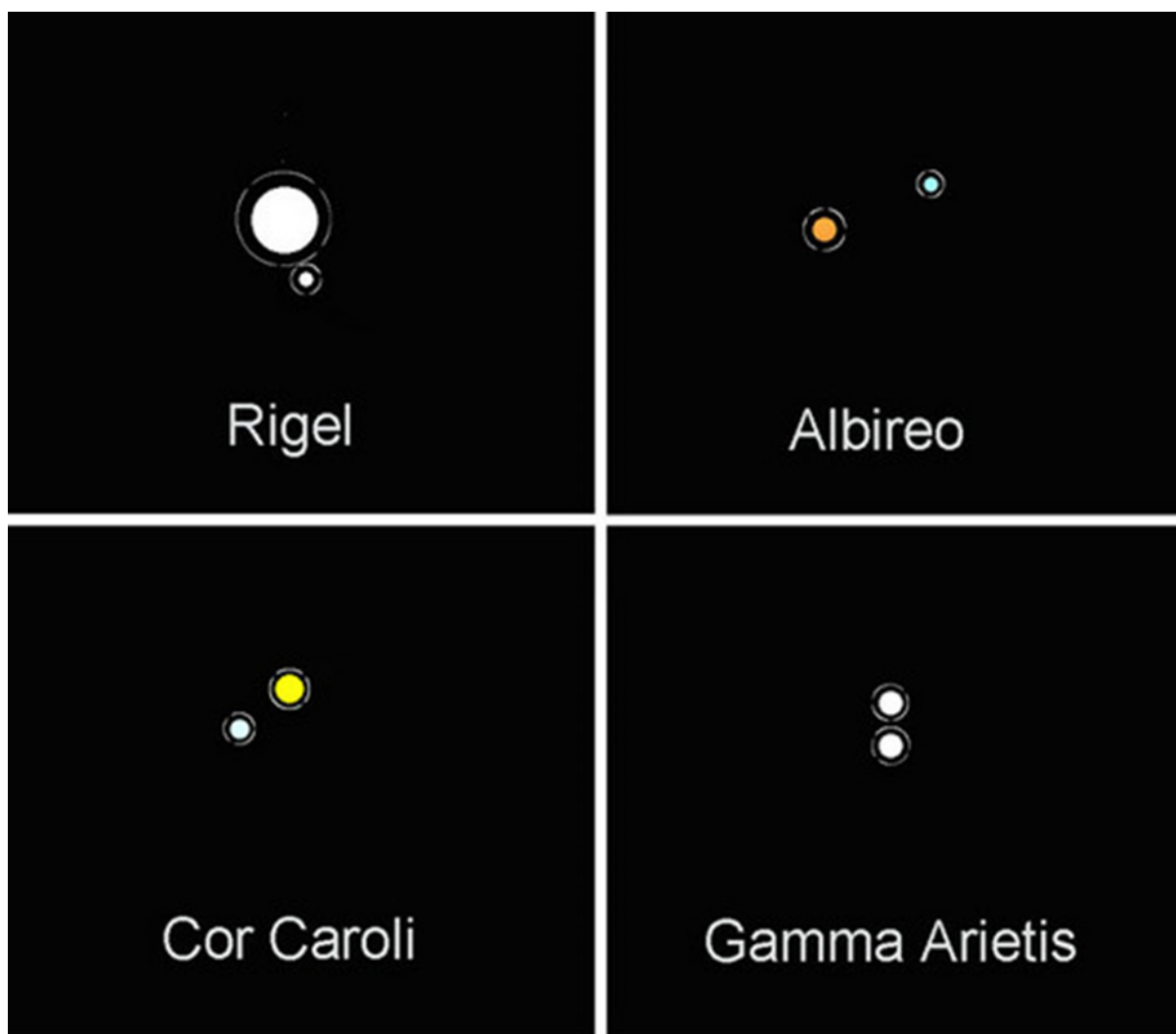


*(Photographs clearly show Antares and its bluish companion.)*

Which brings us to the far more popular ‘Green’ star, Beta Librae or Zubeneschamali, the Northern Claw. This star has been listed by at least four serious astronomers in the past and is often referred to as the only green star in the sky. I too have noticed its green hue- up to two weeks ago! Since then I have been in the unique position of getting a new lens in my right eye, with cataract removed while retaining the left eye cataract for another week! This is my observation. Right eye with its new lens: Beta Lib, a light bluish colour. Left eye, with cataract, Yellowish, with a hint of green!

Conclusion: perhaps a yellow filter- caused by the cataract- combined with the bluish star produces a greenish colour to the eye!

Cont...3



*(Some striking double stars)*

Whatever the reason for our colour perception, one of the most attractive feature of double star hunting is the wonderful contrast of light and colour that the human eye perceives, with or without our ageing filters! Many astronomers also perceive vastly different colours in double stars. (At the next meeting I hope to offer you an easy list of interesting coloured stars.)

### Hubble Captures Stunning Fireworks of Exploding Star

By [Passant Rabie](#) a day ago [Science & Astronomy](#)

The supermassive star first erupted in the 1840s.

Hubble Telescope's image of Eta Carinae shows its hot gases in red, white and blue colors.

(Image: © NASA, ESA, N. Smith (University of Arizona) and J. Morse (BoldlyGo Institute))

The [Hubble Space Telescope](#) caught one spectacular show as the outburst of a supermassive star glows in bright, exploding fireworks.

The star, called [Eta Carinae](#), first erupted 170 years ago and was the second-brightest star in our sky for a little more than a decade. However, over time, the star has slowly faded and become harder to see with the naked eye.



Hubble has observed the star for 25 years, according to a [statement](#) by NASA. Most recently, astronomers used its Wide Field Camera 3 to map the ultraviolet light glow of magnesium embedded in warm gas, and found the gas in places where it had not been before.

"We had used Hubble for decades to study Eta Carinae in visible and infrared light, and we thought we had a pretty full accounting of its ejected debris," Nathan Smith, a researcher at the Steward Observatory at the University of Arizona and lead investigator of the Hubble program, said in the statement. "But this new ultraviolet-light image looks astonishingly different, revealing gas we did not see in other visible-light or infrared images."

This newly discovered gas may have been ejected from the star right before it expelled the bipolar lobes on either of its sides, and is therefore crucial in understanding how the star's eruption began, according to a [statement](#) by NASA.

"This extra material is fast, and it 'ups the ante' in terms of the total energy for an already powerful stellar blast," Smith added.

Eta Carinae is known for its eruptions, which may be due to there being three stars being gravitationally bound within the same system, and will likely die in a supernova explosion, according to NASA.



Cont...2

### 3rd Mysterious Deep-Space Flash Traced to

#### Host Galaxy

By [Mike Wall](#) 2 days ago [Science & Astronomy](#)

The second such pinpointing was announced just last week.

The Owens Valley Radio Observatory is located in the Sierra Nevada mountains of California.

(Image: © Caltech/OVRO/G. Hallinan)



Astronomers just pinpointed the source galaxy of another fast radio burst (FRB), suggesting that these brief and bizarre cosmic blasts may not remain mysterious for much longer.

The newfound explosion — known as FRB 190523 because it was spotted on May 23 of this year — was traced to a big galaxy about 7.9 billion light-years away from Earth, researchers announced in a study published online today (July 2) in the journal *Nature*.

The find brings the number of localized FRBs to three, out of about 85 total detected blasts. FRBs are so hard to track down because the vast majority of them are one-offs — millisecond-long bursts that never recur. Indeed, only two "repeaters" have been observed to date.

In 2017, astronomers managed to trace one of these rare repeaters, FRB 121102, [to a dwarf galaxy](#) about 3 billion light-years away.

And the first pinpointing of a one-off FRB was announced just last week: An Australian-led team determined that a new-found one, [called FRB 180924](#), came from a big galaxy 3.6 billion light-years from Earth.

And now a second team has pulled off this difficult feat.

"Finding the locations of the one-off FRBs is challenging because it requires a radio telescope that can both discover these extremely short events and locate them with the resolving power of a mile-wide radio dish," Vikram Ravi, an assistant professor of astronomy at the California Institute of Technology (Caltech) in Pasadena, [said in a statement](#). Ravi, the lead author of the new *Nature* study, works with the radio telescopes at Caltech's Owens Valley Radio Observatory (OVRO), a facility in California east of the Sierra Nevada mountains.

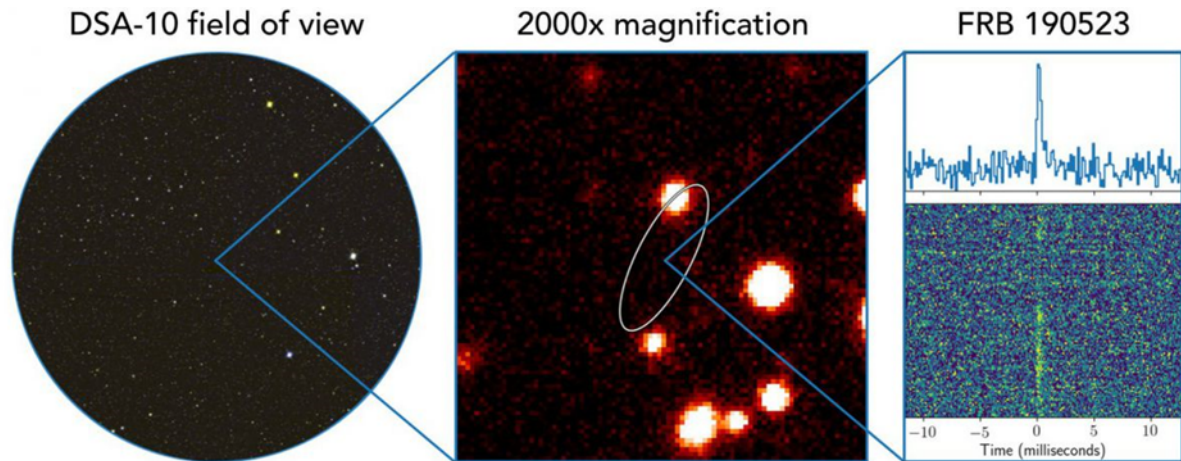
"At OVRO, we built a new array of 10 4.5-meter dishes that collectively act like a mile-wide dish to cover an area on the sky the size of 150 full moons," Ravi added. "To do this, a powerful digital system ingests and processes an amount of data equivalent to a DVD every second."

This "OVRO-10" network detected FRB 190523. Ravi and his colleagues traced the burst to its host galaxy using data from the radio telescopes and the Keck Observatory in Hawaii.



## Astro Events from Frank Gross

Cont...3



Above, a depiction of the field of view of the Deep Synoptic Array prototype that detected the new fast radio burst. Data for that observation is shown on the far right.

(Image credit: Caltech/OVRO/V. Ravi)

The two new localizations show that FRBs can originate in a diversity of environments — big galaxies in addition to dwarfs, for example. And the recent discoveries cast doubt on a favored theory of FRB generation, or at least suggest that it doesn't tell the full story, researchers said.

That idea posits that FRBs are produced by supermagnetic neutron stars known as magnetars.

"The theory that FRBs come from magnetars was developed in part because the earlier FRB 121102 came from an active star-forming environment, where young magnetars can be formed in the supernovae of massive stars," Ravi said. "But the host galaxy of FRB 190523 is more mellow in comparison."

More data will be needed to crack the FRB puzzle. And much more should be rolling in soon, now that astronomers know how to track down the tricky one-off bursts, astronomers said.

For example, OVRO-10 is a pathfinder for a larger system called the Deep Synoptic Array, which will consist of 110 dishes when it comes online in 2021.

"With the full Deep Synoptic Array, we are going to find and localize FRBs every few days," study co-author Gregg Hallinan, the OVRO director and a professor of astronomy at Caltech, said in the same statement. "This is an exciting time for FRB discoveries."

Cont...4

### NASA Selects 12 New Lunar Science, Technology Investigations



Commercial landers will carry NASA-provided science and technology payloads to the lunar surface, paving the way for NASA astronauts to land on the Moon by 2024.

***Credits: NASA***

NASA has selected 12 new science and technology payloads that will help us study the Moon and explore more of its surface as part of the agency's Artemis lunar program. These investigations and demonstrations will help the agency send astronauts to the Moon by 2024 as a way to prepare to send humans to Mars for the first time.

The selected investigations will go to the Moon on future flights through NASA's Commercial Lunar Payload Services (CLPS) project. The CLPS project allows rapid acquisition of lunar delivery services for payloads like these that advance capabilities for science, exploration, or commercial development of the Moon. Many of the new selections incorporate existing hardware, such as parts or models designed for missions that have already flown. Seven of the new selections are focused on answering questions in planetary science or heliophysics, while five will demonstrate new technologies.

## Astro Events from Frank Gross

Cont...5

"The selected lunar payloads represent cutting-edge innovations, and will take advantage of early flights through our commercial services project," said Thomas Zurbuchen, associate administrator of the agency's Science Mission Directorate in Washington. "Each demonstrates either a new science instrument or a technological innovation that supports scientific and human exploration objectives, and many have broader applications for Mars and beyond."

The 12 selected investigations are:

### **MoonRanger**

MoonRanger is a small, fast-moving rover that has the capability to drive beyond communications range with a lander and then return to it. This will enable investigations within a 0.6-mile (1 kilometer) range from the lander. MoonRanger will aim to continually map the terrain it traverses, and transmit data for future system improvement. The principal investigator is Andrew Horchler of Astrobotic Technology, Inc., Pittsburgh.

### **Heimdall**

Heimdall is a flexible camera system for conducting lunar science on commercial vehicles. This innovation includes a single digital video recorder and four cameras: a wide-angle descent imager, a narrow-angle regolith imager, and two wide-angle panoramic imagers. This camera system is intended to model the properties of the Moon's regolith – the soil and other material that makes up the top layer of the lunar surface – and characterize and map geologic features, as well as characterize potential landing or trafficability hazards, among other goals.

The principal investigator is R. Aileen Yingst of the Planetary Science Institute, Tucson, Arizona.

### **Lunar Demonstration of a Reconfigurable, Radiation Tolerant Computer System.**

Lunar Demonstration of a Reconfigurable, Radiation Tolerant Computer System aims to demonstrate a radiation-tolerant computing technology. Due to the Moon's lack of atmosphere and magnetic field, radiation from the Sun will be a challenge for electronics. This investigation also will characterize the radiation effects on the lunar surface.

The principal investigator is Brock LaMeres of Montana State University, Bozeman.

### **Regolith Adherence Characterization (RAC) Payload**

RAC will determine how lunar regolith sticks to a range of materials exposed to the Moon's environment at different phases of flight. Components of this experiment are derived from a commercial payload facility called MISSE currently on the International Space Station.

The principal investigator is Johnnie Engelhardt of Alpha Space Test and Research Alliance, LLC, Houston.

### **The Lunar Magnetotelluric Sounder**

The Lunar Magnetotelluric Sounder is designed to characterize the structure and composition of the Moon's mantle by studying electric and magnetic fields. The investigation will make use of a flight-spare magnetometer, a device that measures magnetic fields, originally made for the MAVEN spacecraft, which is currently orbiting Mars.

The principal investigator is Robert Grimm of the Southwest Research Institute, San Antonio.

### **The Lunar Surface Electromagnetics Experiment (LuSEE)**

LuSEE will integrate flight-spare and repurposed hardware from the NASA Parker Solar Probe FIELDS experiment, the STEREO/Waves instrument, and the MAVEN mission to make comprehensive measurements of electromagnetic phenomena on the surface of the Moon.

The principal investigator is Stuart Bale of University of California, Berkeley.

## Astro Events from Frank Gross

Cont...6

### **The Lunar Environment heliospheric X-ray Imager (LEXI)**

LEXI will capture images of the interaction of Earth's magnetosphere with the flow of charged particles from the Sun, called the solar wind.

The principal investigator is Brian Walsh of Boston University.

### **Next Generation Lunar Retroreflectors (NGLR)**

NGLR will serve as a target for lasers on Earth to precisely measure the Earth-Moon distance. They are designed to provide data that could be used to constrain various aspects of the lunar interior and address questions of fundamental physics.

The principal investigator is Douglas Currie of University of Maryland, College Park.

### **The Lunar Compact InfraRed Imaging System (L-CIRiS)**

L-CIRiS is targeted to deploy a radiometer, a device that measures infrared wavelengths of light, to explore the Moon's surface composition, map its surface temperature distribution, and demonstrate the instrument's feasibility for future lunar resource utilization activities.

The principal investigator is Paul Hayne at the University of Colorado, Boulder.

### **The Lunar Instrumentation for Subsurface Thermal Exploration with Rapidity (LISTER)**

LISTER is an instrument designed to measure heat flow from the interior of the Moon. The probe will attempt to drill 7 to 10 feet (2 to 3 meters) into the lunar regolith to investigate the Moon's thermal properties at different depths.

The principal investigator is Seiichi Nagihara of Texas Tech University, Lubbock.

### **PlanetVac**

PlanetVac is a technology for acquiring and transferring lunar regolith from the surface to other instruments that would analyze the material, or put it in a container that another spacecraft could return to Earth.

The principal investigator is Kris Zacny of Honeybee Robotics, Ltd., Pasadena, California.

### **SAMPLR: Sample Acquisition, Morphology Filtering, and Probing of Lunar Regolith**

SAMPLR is another sample acquisition technology that will make use of a robotic arm that is a flight spare from the Mars Exploration Rover mission, which included the long-lived rovers Spirit and Opportunity.

The principal investigator is Sean Dougherty of Maxar Technologies, Westminster, Colorado.

NASA's lunar exploration plans are based on a two-phase approach: the first is focused on speed – landing astronauts on the Moon by 2024 – while the second will establish a sustained human presence on the Moon by 2028. The agency will use what we learn on the Moon to prepare for the next giant leap – sending astronauts to Mars.

## Lunar Craters by Harry Roberts

### Mary Somerville! At Last!

Virtual Moon freeware introduces crater Somerville thus:

“(Crater) Somerville. Interest: Low interest or difficult formation. Observation period: 3 days after New Moon or 2 days after Full Moon.”

Detailed Name: Mary F Somerville. (Ex Langrenus J)

“Name Author: Birt and Lee (1865).”

Before we imagine Mary being told she was now a lunar ‘name’ in 1865, when she was most active in science, we must look closer at the facts. She *was* short-listed in that year for inclusion in a large British Association Moon Map, for which meteorologist and amateur Moon-mapper W. Birt was appointed as chief cartographer, with help from a friend (Lee). The whole map would be 200inches or five meters in diameter! A big map indeed! Still, Mary’s name was now on the list of names to be used. Unhappily, it stayed there while the whole thing failed for various reasons. Likely she was aware of the project’s failure.

By this time she was widely known and celebrated and in some cases rewarded: a Civil List pension of £300 a year in 1835 was a very good sum at the time! Her books on Maths and Science, Maths and Geography were enormous successes. With medals and honorary memberships too!

Not bad for a largely self-taught Scottish girl with little formal education; but Dad was an Admiral, which may have helped. Typical of the times she bore six children but lost three; and one husband too. But the crater naming would wait for a century after her death!

**Crater Somerville.** Mary’s crater is a 20thC naming - from that abortive 19thC list? Her name is found in footnotes to IAU transactions around 1976 when her name is used on Space-Age maps, apparently for the first time. It was a long wait. But somehow the very small crater Langrenus J is now Somerville. Were there no better options?

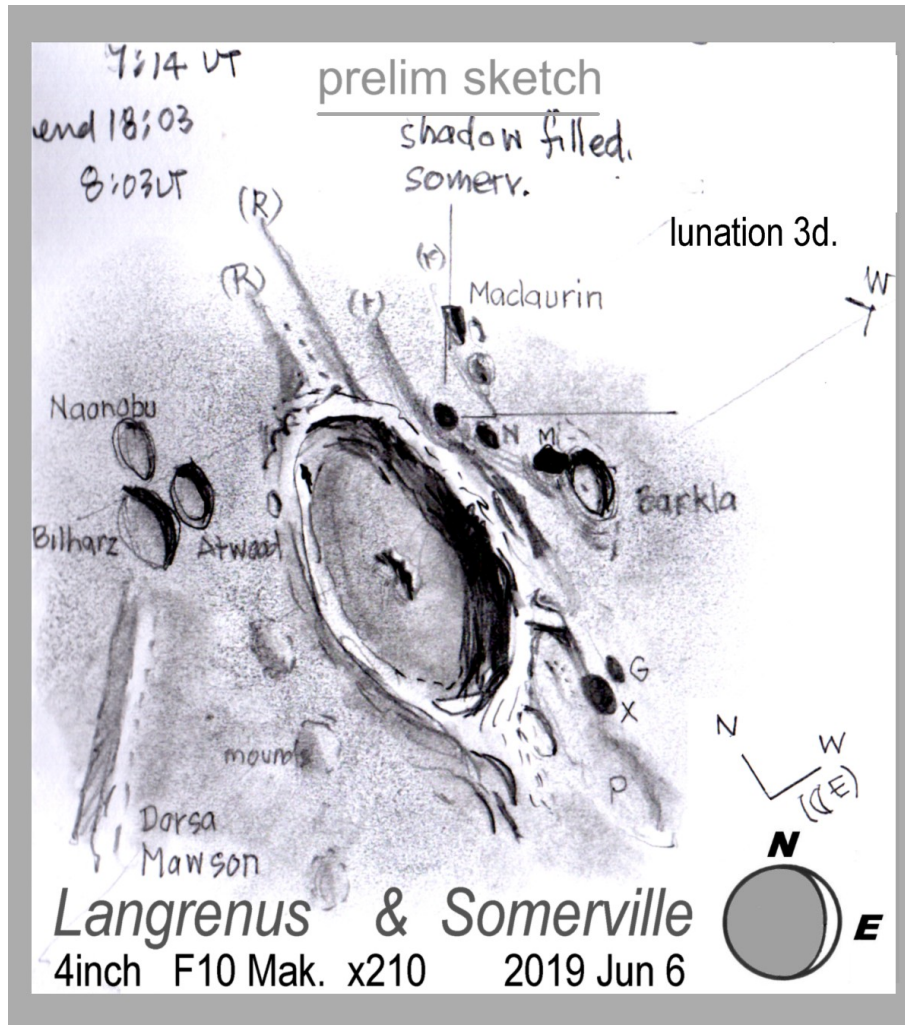
Crater Somerville, only 15km diameter, lies on a low ridge immediately east of giant Langrenus (132km diameter) in rough terrain - made even rougher as it is only 30 deg. from the limb, where features seem crowded together.

On June 6 in the 4 inch ‘Mak’ several small craters (lunar) E of vast Langrenus were filled with shadow – one might be Somerville – a crater I had hoped to sketch for a long time. But the Moon’s altitude of ~20 deg meant it had to be a quick sketch; yet it did show elusive Somerville, finally! (Fig next page). The preliminary sketch will need a second view to confirm details.



## Lunar Craters by Harry Roberts

Cont...2



To the right (Fig, lunar E) of Langrenus a narrow ridge running N-S had four craters planted on it, Barkla was largest at ~40km dia (a 'Brit' Nobel physicist), with Langrenus M on its limb (a distorted shape) then crater N and at the end (once crater J) was Somerville – just 15km diameter, still in black shadow from the rising Sun. Interesting terrain lay to the left of Langrenus (lunar W): a crater trio (Bilarz etc) seemed to terminate a long low Mare ridge that, to my surprise, memorializes Douglas Mawson, 'Aussie' polar explorer (who taught the writer's Dad geology in the 1950's; it's a small World!)

Seeing crater Somerville isn't easy: which is something of a pity for such an important early scientist. If readers have seen the award-winning film "Mr Turner" they may recall her visit with the Turners, where she displayed the solar spectrum and effects of magnetism: a rare thing in any film!

**Women on the Moon.** How many lunar crater names memorialise women scientists? About twelve, it seems? The IAU at one stage also used eight or so generic female names (most on Rukl Map 19), for what reason? Why not use real women of science? Plenty are available! Of the 12 real women I know, 8 have been sketched. Of the 8 generic names used by IAU, one has been sketched: amazing Bela near the Apollo 15 site.

The Moon: an amazing sight in almost any 'scope, is a repository for a lot of human history: most of it entirely forgotten! Keep those lunar 'scopes ready; clear skies!

**More Club News continued from page 1**

**The AGM was held at the July 2018 monthly meeting. Elected officials for 2018 - 2019**

President: Frank Gross  
Vice President: John Gould  
Secretary/Treasurer: Tracey Newcombe  
Public Officer; Frank Gross  
Observation Officer: Robert Turnbull  
Editor: Kaye Johnston  
Librarian: Chris O'Hanlon

The Committee: Robert Turnbull, Rudolf Henssen, Robert Spruyt, Jack Apfelbaum, Chris O'Hanlon, John Gould

**Check out the Astro Flyer on the web site: [www.shoalhavenastronomers.asn.au](http://www.shoalhavenastronomers.asn.au)**

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The deadline for Articles for the Astro Flyer is The First Friday of the Month.

Editor Kaye Johnston

**Club Video Projector Rental**

The Video Projector is available for club members for a small rental fee. If a club member would like to project a football game, cricket game onto a wall for a party this is the way to go. You will get up to a 100 inch diagonal picture on a light coloured wall with the Epson video projector. The projector has an inbuilt speaker but you can add your own speaker units if necessary. The unit s very easy to use and instruction would be given before the borrowing (2 days) occurs. The rental price is set at present at \$15 for two days.