

Hello All,

Lots of things to tell you in this message: First of all the Astro BBQ at Marriott on Sunday the 29th of October was a big success. We had about 14 people show for a sausage sizzle and some delicious wraps. among other things. It was warm and the sun was out in a mostly cloudless sky. The Shoalhaven River Festival was on so we had no trouble in finding a place to set up.

The club has been donated a large 16 inch Dobsonian by David and Divina Hutcheson. Read the story in the Astro Flyer. Another, smaller telescope has been donated and will be sold by the club at a later date. The telescope is an equatorial mount, 3 inch mirror, National Geographic model with aluminium tripod. It seems like it is in near new condition. I'll email all members once I put the scope together to check it out.

See you all at the monthly meeting. Frank Gross President

# **Club Meetings and News from Committee**

**The next Club Meeting is to be held on Friday November 17th 2017 at 7.00 pm for 7.30pm start** at Shoalhaven Campus, University of Wollongong. Nowra.



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MOON PHASES



# **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 Dec 9th (back-up night Sun Dec 10th) at Woncur Road, South Nowra.

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

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# OUT THERE Bob Turnbull OBSERVATION OFFICER

## **OUT THERE JAN.FEB 2018**

By the time you use this document it will be another new year, so time to try the astronomical gifts you dropped heavy hints about with family and friends before the festive season! What? You didn't get any astronomical gifts, OH Well there's always your up and coming birthday.

#### THE MOON

Closest to Earth at 356,565km on 2<sup>nd</sup> of January, and if you take some lunar photos then and later on the 15<sup>th</sup> January this Moon will be at its furthest at 406,464 kms away from Earth.( 49899 kms further away !) So, show us the results at the first meeting after this in the Astro flyer.

BLUE MOONS, The second full Moon in a month is called a BLUE Moon and no, it's not blue and happens at regular intervals (not "Once in a blue moon" to describe something rare, at all) Total Lunar eclipse can be seen on the 31<sup>st</sup> of January at 11pm (refer to page 91 for the three partial Solar eclipses and two total Lunar eclipses, of Astronomy 2018)

#### FOUR PLANETS IN THE MORNING SKY

#### MERCURY

Will be seen on the 2<sup>nd</sup> of January in the eastern morning sky but will be placed better on the 13<sup>th</sup>- 14<sup>th</sup> with Saturn at less than 1 degree apart. (No viewing of Mercury in February, too close to SUN.)

#### VENUS

Too close to the SUN until end of FEBRUARY when barely above the horizon. It then becomes a brilliant object until October.

#### MARS

Will be the show piece of this year! In July it will attain a maximum diameter of 24.31 less than one arc second or 97% of the best ever opposition. Have a look on page 45 on 27<sup>th</sup> of July WOW!

#### JUPITER

Begins the New Year in the predawn eastern sky in Libra and has a close encounter with Mars at its closest of 0.25 degrees. On the 7<sup>th</sup>.Watch the maps on page18 for planet positions.

#### SATURN

Close to Mercury in the morning Eastern sky.

#### URANUS

North western evening sky in Pisces in January and February.

**COMET C/206 R2 (PANSTARRS)** 10<sup>th</sup> magnitude opens in Taurus in the first week of January near Aldebaran, and skirts the western edge of Hyades and sets at midnight at months end. In February this comet continues to reside in Taurus.

#### **GOOD WISHES FOR THE FESTIVE SEASON TO YOU ALL! AND A HAPPY HEALTHY 2018** Bob Turnbull

# Sky Objects By Eugene O'Connor



A Search for Southern Doubles

**Episode 10: Pegasus, the Flying Horse** 



As Pegasus, the Flying Horse mounts the NE sky in late spring it carries with it the greatest galaxy in the night sky and the most distant object visible to the naked eye, namely, the Andromeda Galaxy.

Its visit to our sky is all too brief as those who try to capture a tantalising glimpse of this galaxy can attest, and too often it is swamped by the approaching summer nor'easter breezes heralding the arrival of summer to our climes.

## **Sky Objects By Eugene O'Connor**

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Pegasus, however briefly, displays some fine coloured double stars and the famous star 1 Peg, a truly remarkable visual binary with the longest period I have ever come across. This constellation with its great square dominates our sky during the coming months but it dips quickly back below the horizon, so as the sales spruikers put it," be quick on this one!"

**1.Enif, Episilon Peg.** RA Hr21.44.2;Dec +09.53'; mag 2.5/8.7; Sep. 144".

This outstanding double marks the nostril of The Flying Horse (See above graphics).

This is an easy object in a small scope and the colour contrast of pale yellow and blue make this a rich find.

2. Kappa Peg. RA 21.44.6; Dec + 25.39'; mag 4.1/10.8; Sep.14.5".

This star is fainter than the previous double but is located as the star that marks the end of the upper foreleg of Pegasus, or the third star from the wide visual double of Mu and Lambda Peg. (see map below). This a pears as a white and gold pair in a moderate scope and another bright star is visible nearby in the finderscope. Several faint stars appear between these stars in a moderate eyepiece.

**3.** Matar, Eta Peg. RA 22h 43"; Dec + 30.13'. mag 3.0/9.9; Sep 93.8".

This wide pair is easily spotted, and is marked in the above diagram by the star where both forelegs meet, near Beta Peg on the map below.

The primary star is golden, and the wide faint companion is a faint delicate blue star.

Early observers have noticed the primary may sometimes have a deeper colour and it was found to be a carbon star. The companion is a close binary.

4. 57 Peg. RA 23.09.5; Dec. +08.41'; mag.5.1/9.7; Sep. 32.6".

Although fainter than previous doubles, 57 is easily spotted as it marks a small group of mag 5 stars that mark the apex of a triangle whose base is Alpha and Zeta Peg.(see map below). I needed high power to dar en the field sufficiently to identify the wide bluish companion of 57, itself a yellowish star. Early observers (using refractors) see the companion star as Greenish.

5. 1 Peg. RA 21.22.1; Dec. +19. 48'. Mag 4.2/7.8; Sep 35.9".

This is an amazing binary, a little difficult to find but worth the hunt. It was recently observed to have an amazing 17,500 years period (see plot below) and while most binaries are difficult objects for small tel scopes, this one is easy in a small scope.

Getting there: I found that the easiest approach was to use the finderscope to star hop from Kappa Peg SW

to 2 Peg  $(4^{\circ})$  and then at about the same distance away you arrive at 1 Peg. (see map below). I observed this

binary as a rich gold and blue pair, nicely contrasted and easily split. Worth the journey.

## **Sky Objects By Eugene O'Connor**





**Diagram above showing the massive 17,500-year orbit of 1 Peg.** (2017 lies on the lower left). Finally, in the map below, where all the doubles are circled in red, you will find the Andromeda Galaxy marked in orange circles. Easily spotted in small binoculars or finderscope, this is the most famous galaxy next to our own and with a visual mag of 3.5 and a distance of 2.5M ly, it is the farthest object seen by the unaided eye. It is best observed from the northern hemisphere and it is very low in our area for study in a Dobson telescope.



#### Huge cave found on moon, could house astronauts: Japan scientists

Tokyo (AFP) - Scientists at Japan's space agency have discovered a huge moon cave that could one day house a base that would shelter astronauts from dangerous radiation and wild temperature swings, officials said Thursday.

Data taken from Japan's SELENE lunar orbiter has confirmed the existence of the 50 kilometre long and 100 metre wide cavern that is believed to be lava tube created by volcanic activity about 3.5 billion years ago.

The major finding was published this week in US science magazine Geophysical Research Letters.

"We've known about these locations that were thought to be lava tubes...but their existence has not been confirmed until now," Junichi Haruyama, a researcher at the Japan Aerospace Exploration Agency, told AFP on Thursday.





The underground tunnel, located under an area called the Marius Hills, would help protect astronauts from huge swings in temperature and damaging radiation that they would be exposed to on the moon's surface, he added.

"We haven't actually seen the inside of the cave itself so there are high hopes that exploring it will offer

more details," Haruyama said.

The announcement comes after Japan in June revealed ambitious plans to put an astronaut on the Moon around 2030.

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"We will return American astronauts to the moon, not only to leave behind footprints and flags, but to build the foundations we need to send Americans to Mars and beyond," US Vice President Mike Pence said this month.

That was the first time the agency had said it aimed to send an astronaut beyond the International Space Station.

The idea is to first join a NASA-led mission in 2025 to build a space station in the moon's orbit, as part of a longer-term effort by NASA to reach Mars. The US also announced the country is committed to send astronauts to the moon.



# A WEIRD, DISTANT POTATO-SHAPED WORLD GETS WEIRDER: HAUMEA HAS RINGS!



Astronomers have just determined that the rock-and-ice worldlet **Haumea** is part of an increasingly less-exclusive club: solar system objects with rings.

Haumea is what we call a Trans-Neptunian Object; something orbits the Sun beyond the orbit of Neptune. This includes many trillions of bodies, most of which are rather small.

Pluto is the biggest we know of, though Eris is very nearly the same size. Haumea is smaller than that but still one of the biggest TNOs known.

#### Cont...3

Its size is actually a little difficult to describe, because it's not spherical. Far from it! It's actually prolate, elongated like a rugby ball or an American football. But even then it's not symmetric. Along its longest axis it's a little over 2,300 km across, very nearly the same as Pluto. But it's considerably flattened; through its shortest axis it's only 1,025 km wide and 1,700 through its intermediate axis. Its shape is most like a flattened potato, about the only analogy I could think of. So right off the bat this is a weird object.

Artwork depicting Haumea with its ring; the proportions shown are correct. When you think of rings you undoubtedly think of Saturn. If you have a little more inside astronomy info, you'll know Jupiter and Uranus have rings, too, while Neptune has ringlet arcs, incomplete rings around it. And if you're really in the know, you'll remember that two Centaurs (icy bodies orbiting the Sun between Jupiter and Neptune) called Chariklo and Chiron have rings, too. And now we know Haumea has rings too, the first TNO known to possess them. They were discovered on January 21, 2017. Some months before that astronomers projected Haumea's orbital motion into the future and saw it would occult, or pass directly in front of, a distant background star. That means the starlight would drop as it's blocked by Haumea. And that's very important.



Schematic showing the shape of Haumea based on the observations; the paths of the star seen by different observatories are shown in blue. Credit: Ortiz et alZoom In

#### Cont...4

For one thing, occultations help astronomers figure out how big an object is: Knowing its motion and how long the star is blocked tells you how big the object is. If you observe it from different latitudes on Earth you can also get a rough shape for it, too; from different viewpoints the star cuts different chords behind the object, so an outline can be found. I described this in detail recently for another distant TNO, when MU69 occulted a star and it was found to be binary. But there's more. If you observe the object well before and after the main body occults the star, you might see other dips in starlight too. A moon could block it ... or rings.

So a dozen observatories at 10 locations in Europe observed the occultation that night. The main event lasted about two minutes, but about a minute before and a minute after, dips were seen in the starlight. This is what you'd expect for a ring extending well outside the main body of Haumea. It can't be two moons, one on either side, because the star's light wasn't completely blocked; it dropped by about 50%, so the blocking object isn't solid.



It must therefore be a ring, composed of countless tiny particles. Schematic of Haumea and its rings based on the observations (the traces of which are shown in red).Schematic of Haumea and its rings based on the observations (the traces of

The ring is about 70 km wide, and orbits directly over Haumea's equator, with an orbital radius of about 1,145 kilometers.

which are shown in red). Credit: Ortiz et al

So now that we know it exists, the question is why does it exist? How did it form?

We have clues. Haumea has two moons, and it's thought that outer solar system objects with moons probably got them through collisions. Something big smacked into the TNO, blasting debris out, which coalesced to form the moons.

Several other smaller TNOs share similar orbits with Haumea, suggesting they all formed together and spread out over time; that's consistent with a collision as well. Haumea itself rotates extremely rapidly, spinning once every 3.9 hours (that partially explains its weird shape — it's due to rotational flattening). Normally, something Haumea's size would spin far more slowly, so perhaps the impact was a little off-center, spinning Haumea up.

The rings would then be debris left over from that collision. They're too close to the main body to coalesce to form a moon: The tidal force from the gravity of Haumea prevents them from clumping up. But the formation of the rings is still unclear. We need a lot more observations to figure that out. The star that was occulted was rather faint, so big 'scopes were needed to observe it at all. If a brighter star gets occulted then more information can be gleaned from the event. That could certainly help us understand what's going on.

And the implication is interesting, too. If Haumea has rings, how many other TNOs do as well? From the New Horizons flyby we know Pluto doesn't, but there are lots of big TNOs. Most have moons as well, so we know collisions happen. Haumea may be the first TNO found to have rings, but I'd bet significant cash it won't be the last.

#### Cont...5

#### Shoalhaven Astronomer's Sunday BBQ A Success

October 29<sup>th</sup> at Marriott Park we had a club BBQ starting 11 AM. It was well attended with about 13 club members and their friends enjoying the BBQ Frank Gross had organized. Unfortunately the council BBQs malfunctioned and didn't heat up as requested. Fortunately Frank had brought his gas burner and skillet which fixed up that predicament. Ian Scott brought the Clubs borrowed Coronado Hydrogen Alpha Sun Solar scope and we all had a look at (at the time) a non active sun. Tracey Newcomb did the same with her familie's own solar scope and we repeated the process. Much food was brought and enjoyed. We will certainly do this again soon!



A few of the boys having a discussion at the BBQ.



People just starting to arrive in the pergola.



Eugene and his new friend Nobby.

#### Cont...6

## **Stop Press**

The Shoalhaven Astronomers have been given a giant new telescope by David and Divina Hutcheson of Worrigee. The scope is a 16 inch Meade Lightbridge of mostly metal construction. It is missing eyepieces but that can be fixed up. The president could barely fit it all into his car and single handedly could not lift the boxed base out of his car and had to call for help. We will have to discuss what we are going to do with this windfall for the club as it might just be a little to big for us to handle it easily. It is worth in the vicinity of \$1500 to \$2000.

## **Instruction Manual**

8", 10", 12", 16" LightBridge™ Truss Tube Dobsonian Telescopes



<image><image><image><image><image><image><image>

The boxed base of the telescope in the president's car. Too much for him to lift.

# Lunar Snippets by Harry Roberts

## **Pristine Proclus**

Perhaps the most eye-catching feature of the first quarter Moon is the bright area between the Maria Crisium and Tranquillitatis called, enigmatically, Palus Somnii - the 'Marsh of Sleep'. Once upon a time, into this 'sleepy swamp', came a projectile moving from the (lunar) southwest at high speed – excavating Proclus on impact. This is one of the brightest lunar craters and quite young, perhaps much less than100My old: a nice example of a small 'pristine' crater.

Proclus is also one of the <u>low angle impact</u> craters – where the impact angle is 15° or less - and they are relatively uncommon on the Moon. Experiments show that at low angles impact ejecta and crater rays take unusual shapes – often with lateral 'wings' of ejecta on two sides, and none on the approach side. 'Down range' slender narrow rays may result: the Messier pair is a good example.

Thus Proclus has a wide zone without rays facing SW, and bright 'wing' like side-rays: a 'fan' of bright ejecta that makes the 'marsh' (Pallus Somnii) appear as if raised above the dark Tranquillitatis lavas to the west (It's not however). To the east, some of Proclus' rays cross M. Crisium: it's an eye-catching part of the Moon.



Crater Proclus is just 28 km diameter and very bright due to its freshness. Looking closely (Fig) we see it's not round, but rather a distorted, pentagonal shape – one result of the low angle impact, maybe.

The southeast side (arrowed), the direction of the impactor's approach, has been reshaped by rim collapse: it seems two landslips have taken curved 'bites' (or scallops) out of the rim – the collapsed material now forms mounds on the crater floor some kilometres below.

When the sketch was made the sun's altitude was just 16° and shadow filled half the crater –the debris on the floor showed as dimly lit hummocks. Two open arrows point to lateral 'wings' of crater ejecta on either side of the impact site, partly covering older terrain. Most of the surroundings of Proclus are 'veneered' with bright impact ejecta.

# Lunar Snippets by Harry Roberts

#### Cont...2

**Apollo 17** 'pan' camera frame AS17-P-2270 (and P-2265) shows Proclus' floor is covered with collapse debris –most large craters have at least a kilometre or two of such 'fill'. On the Quickmap Profile I have 'dotted' the 'original' crater profile – to highlight the 'fill' that now covers the floor.

While there is no sign of lava flooding in this crater- the lunar 'volcanic' era was long over when it formedsome signs of impact melt appear, it seems, in the Apollo 'pics'.

**Horizontal bands?** On the night horizontal strips of both lighter and darker material seemed to be visible on the crater walls. A feature of some very fresh craters, this is attributed to the crater exposing darker terrains well below the lunar surface. Or was it an illusion? The 2010 August 19 LPOD image by M Weigand seems to confirm the bands are real.

**Quickmap** © profiles show Proclus is 4.5km deep (rim to floor) on the NE side, where it impacted amongst lunar mountains, but on the SW side it is just 2km below the lunar surface (the rim is another 1km higher). The profile shows the wall is between 20° to 30° incline, though it looks steeper.



The profile looking NE (Fig) shows a high rim on the NW side with a 30° decline into the crater and hummocky debris on the floor. On the east side a hummock of debris a kilometre higher is seen, no doubt from the 'scallop' landslips of the south rim. Note that the Quickmap profile exaggerates the vertical relief (~4:1 in this case)

Perhaps the mountains surrounding ancient M. Crisium were strongly consolidated by the shock of that multi-ring basin impact: - and they now support the high walls that resulted from the Proclus event. Surroundings: The terrain around Proclus is ancient and degraded with

low relief: secondary craters **S** and perhaps **K** are marked - almost 'ghost' craters – and the whole area is 'veneered' with Proclus' bright ray material.

Take a closer look – low altitude illumination is best - under high illumination glare degrades the view. Post Apollo research turned up many craters with ages much less than 50My – some, presumably associated with the famous Tertiary-Cretaceous extinction on Earth. Proclus may well be one of these very young craters. Its small diameter means you need about 50 times magnification for each inch of telescope aperture.

#### 1.http://www.lpi.usra.edu/resources/apollo/frame/?AS17-P-2270 2.:Apollo Over the Moon" NASA SP-362 p147.

Proclus Diadochos was an Athenian philosopher and mathematician (410 - 485 AD), and the crater is one of Riccioli's original namings –appearing on Grimaldi's 1651 map; surprising perhaps, as it must be one of the smallest craters in Riccioli's list: an 'old' name for a 'young' crater!

Witnessing the Proclus impact would have been an amazing experience: assuming one had a safe vantage point! After all, the Proclus event was the biggest thing to have occurred in the 'sleepy swamp' for several billion years!

## More Club News continued from page 1

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) but consult Jack first on Landline: 44232255, Mobile:0407 018 982

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

Dates for Club/Social Viewing Nights for 2017 On Saturday Nights As Follows:

#### Dec-9

# **More Monthly Meeting Information**

## The AGM was held at the July monthly meeting. Elected officials for 2017 - 2018

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

Shoalhaven Astronomers	The deadline for Articles for the Astro Flyer is The First Friday of the Month.
PO BOX 1053 Nowra NSW 2541	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.