

# Astro Flyer

## JANUARY 2020



### Club News

#### To the SA Members

Thank you to those who attended the Xmas dinner. If you weren't able to make it you missed an enjoyable evening!

We are starting 2020 off with a presentation from Eugene O'Connor who tells me he will be speaking on "*The Quest for Atlases and Maps that may make our search of the night sky easier*". Please come prepared with some tricky questions for Eugene and any ideas you might have. If you are like me, sometimes you find it difficult to match what is in the atlas with what you can actually see!

Each of you will have received an email from the SA website inviting you to login and set a password. This will give you access to an additional menu of members only material including the presentations we have each month.

I have also added a link to a YouTube channel entitled "*The Astro Imaging Channel*" (TAIC). Each week a live presentation and discussion is streamed on a topic of interest. If you miss the live stream the session is still available for viewing on YouTube. It is run by a group of enthusiasts (primarily US based) with topics that are very interesting and well presented.

See the channel at:

<https://www.youtube.com/channel/UCiR5AmROq4YcXF8hCxxZQ-g/videos>

See you all at the meeting on the 17<sup>th</sup> Jan 20. President Mark Town

**Next monthly meeting will be held at the Shoalhaven Campus of the Uni of W'Gong, George Evans Road off Yawal Road, West Nowra, January 17th 6.30 pm for 7pm start.**

#### Contents

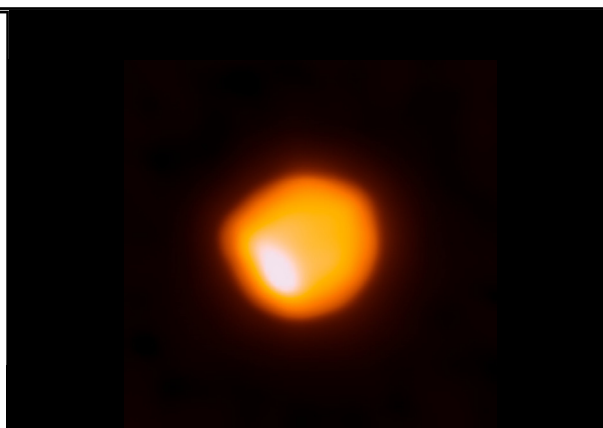
*Out There and  
Bob Turnbull* Page 2

*Viewing Nights and  
information* Page 3

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

*Astro Events Frank  
Gross* Pages 7-14

*The LMC A Mud Map3  
by Harry Roberts*  
Pages 15-16



#### MOON PHASES



**New Moon   First Quarter   Full Moon   Last Quarter**  
**25th Jan   2nd Feb   9th Feb   18th Jan**

#### 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 **Jan Saturday 18 (back-up night Jan Sun 19)** at 5PM at University Viewing Site (see page 3 for directions).

*More Club Information  
Page 17*

**OUT THERE**  
**Bob Turnbull OBSERVATION OFFICER**

**JANUARY**

Hello and a GOOD NEW YEAR TO YOU ALL!

Observations will be almost impossible with the record breaking Bush Fires we are continuing to experience. We have been providing refuge to some who have needed to shift their property and leave from our closest fire, but so far no losses have been experienced.

So let us review some of the possible viewing with the Moon and planets, which are the most likely we might see through the smoke and clouds.

**THE MOON**

January 17<sup>th</sup> will show the Maximum Libration 7.4 degrees dark SE Limb, 7pm WST)

All the listed Lunar events are listed in WST which needs to be adjusted to EDL time from page 109 in your Astronomy 2020 issue.

**PLANETS**

**VENUS** A brilliant Western evening sky object from now until the end of May, when it's apparent size blows out from present diameter of 14.0" and magnitude -4.0 to diameter 48.5" and magnitude - 4.6 on May 15<sup>th</sup>, when it will be a dull sliver of light, due to its proximity to the Sun.

**MARS**

Spends most of January crossing Scorpius in the morning sky then in Orphiuchus then in conjunction with Antares at 5 degrees apart.

**JUPITER**

Is low in the Eastern dawn sky in Sagittarius by the end of January, see page 8 of your Astronomy Magazine for amazing information and pictures.

**SATURN**

Unlikely to be observable because of its conjunction with the Sun, but will be seen in the morning sky in February.

Hopefully some of these objects will be cleared from light pollution for you to see constellations also by next month.

**GOOD LUCK**

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).

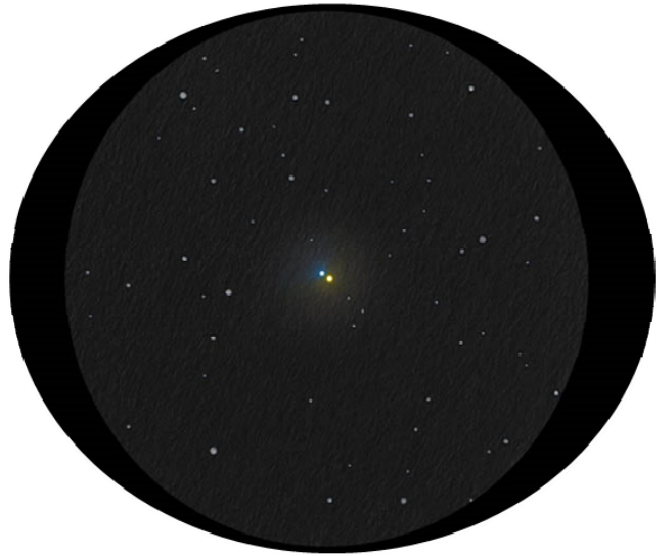
**University Viewing site.** On the way to the university on George Evans Road go straight ahead through the second turning circle to the new viewing site.

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.

## Hidden Doubles 1

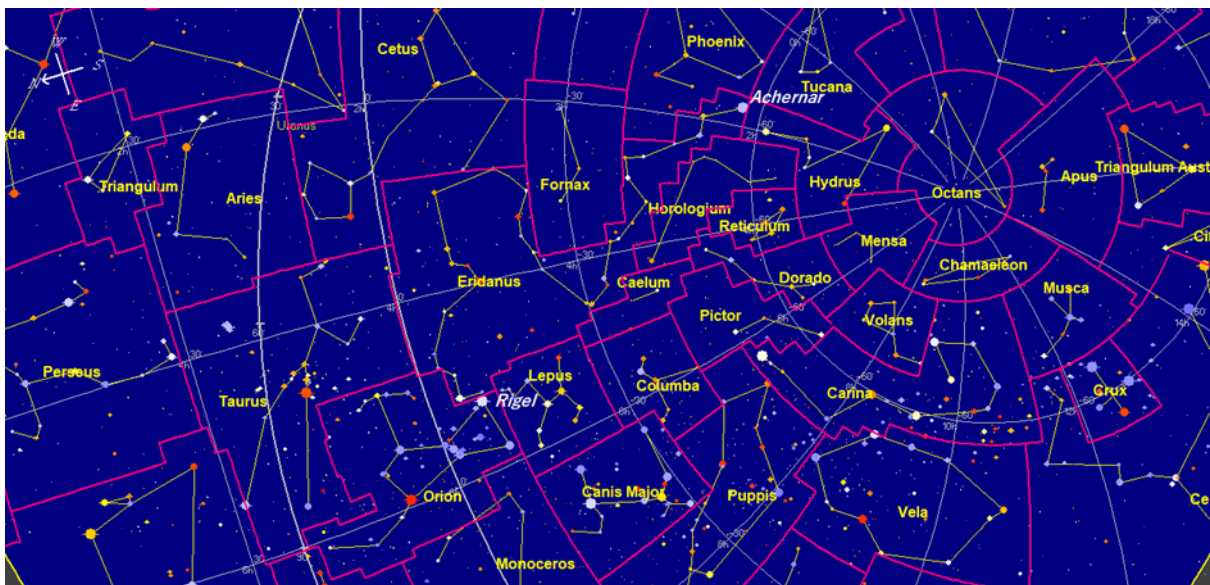


*Jeremy Perez C8*

In 2018 I took viewers through some of the well-known constellations and many vintage double stars that were relatively easy to find. It has been my experience that many fine objects are hidden in obscure constellations which are worth the effort in tracking down. One of the best examples of this is the huge and meandering constellation Eridanus, The River. I have studied more than twenty worthy double stars in this star group, and they are easily spotted in a moderate telescope. For this reason, I am spending two months on this constellation.

**Eridanus.** Hipparchus, 2<sup>nd</sup> Century BC, who made his mark by mathematical and astronomical measurements of surprising accuracy for the times, called Eridanus, 'The River of Orion,' with some justification as it 'rises,' close to the giant star Rigel in Orion (see map 1 below), which is itself a challenging and famous double star. This 'river of stars' then winds its way alongside, Taurus, Lepus, Cetus, Fornax, Caelum, Horologium and Phoenix, before reaching its mouth in the bright star Achernar (river's mouth) on the border of Tucana and Hydrus. In the coming months it stretches from the mid-northern constellation Orion right overhead to almost the Megellanic Clouds in the far south. (See map 1 below for the entire constellation in its setting: Achernar (mag 1) top right of map, river's mouth, Rigel(mag 1) bottom left, near its source.)

*(Below, overview of the entire constellation in its setting) Map 1*

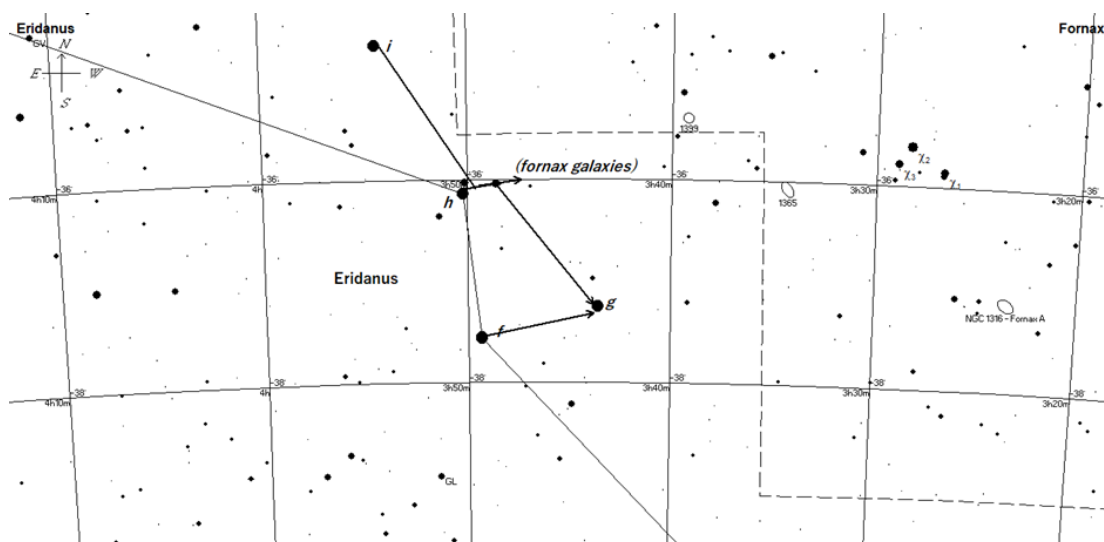


Cont...2

## Eridanus Doubles; The Southern Section: Part 1.

*The following list contains in order: Name of star; RA and Dec; Magnitudes; Separation; Comments on location and view in the eyepiece of a 10" Dobsonian telescope.*

- 1 P Eri.  $\Delta$  5. (Dunlop 5.) 1hr.39", -56.12; 5.8/5.9; (11.2"). This a deep yellow binary with a 480-year orbit and just over a degree NE of Achernar. The richness of daffodil colours is this near equal pair is striking.
- 2  $\Delta$  4. 1hr.38. 1hr.38", -53.27<sup>0</sup>; 7.2/8.5; (10.3"). Moving a few degrees north in the constellation and forming a finderscope triple broad triangle with q1 and q2 Eri is another delightful yellow pair, this time with contrasting shades of yellow in a moderate eyepiece.
- 3 X Eri. 1hr.56", -51.37<sup>0</sup>; 3.7/10.7; (4.9"). This is a challenging object as the components are closer together and the grey companion is very faint in contrast to the white primary. Pick a clear, dark sky.
- 4  $\Phi$ Phi Eri.  $\Delta$  6. 2hr.17", -51.25<sup>0</sup>; 3.2/9.3; (89.6") This is the next bright star in the chain of Eridanus heading E. The primary is White with a bluish tint and the wide blue companion can easily be spotted in a small scope. l.y.154
- 5  $\theta$ . Acamar 2hr.58", -40 18<sup>0</sup>; 3.2/4.1; (8.4"). Set in a neat wide triangle with I and s Eri, this is a brilliant double, dazzling white and light blue, nicely separated at low power. Hartung refers to it as, "One of the gems of the southern sky." I can see why.
- 6  $\Delta$  15. 3hr. 39", -40 22<sup>0</sup>; 6.9/7.7; (7.6") Located 30' east of Gamma ( $\gamma$  Eri) an easily- split binary star. The main star is an erupting variable, 430 ly away. A dainty white and light blue pair.



Finder chart for *f* Eridanus (gateway to Fornax Galaxies).

(I have attached-above- a close- up of the group of *f,g,h,i* Eri as an aid to finding the double star *f* and to help in star hopping to the Fornax galaxies 3<sup>0</sup> west and visible in 10" machines.)

- 7 *f* Eri.  $\Delta$  16 RA 3hr.48". -37<sup>0</sup>37'; 4.7/5.3; (8.4"). Another favourite of Hartung: "The beautiful pale-yellow pair dominates a field of scattered stars and is a fine sight in a 75mm scope." This may shock you but my colour estimates are reddish and blue!

- 8 16 Eri.  $\tau$  4. RA 3hr.19. Dec.-21<sup>0</sup> 45'; 3.9/9.2; (5.7"). It took X180 magnification to split this impressive star. The contrast in brightness and configuration suggest a small white planet with a tiny mustard-coloured moon nearby.

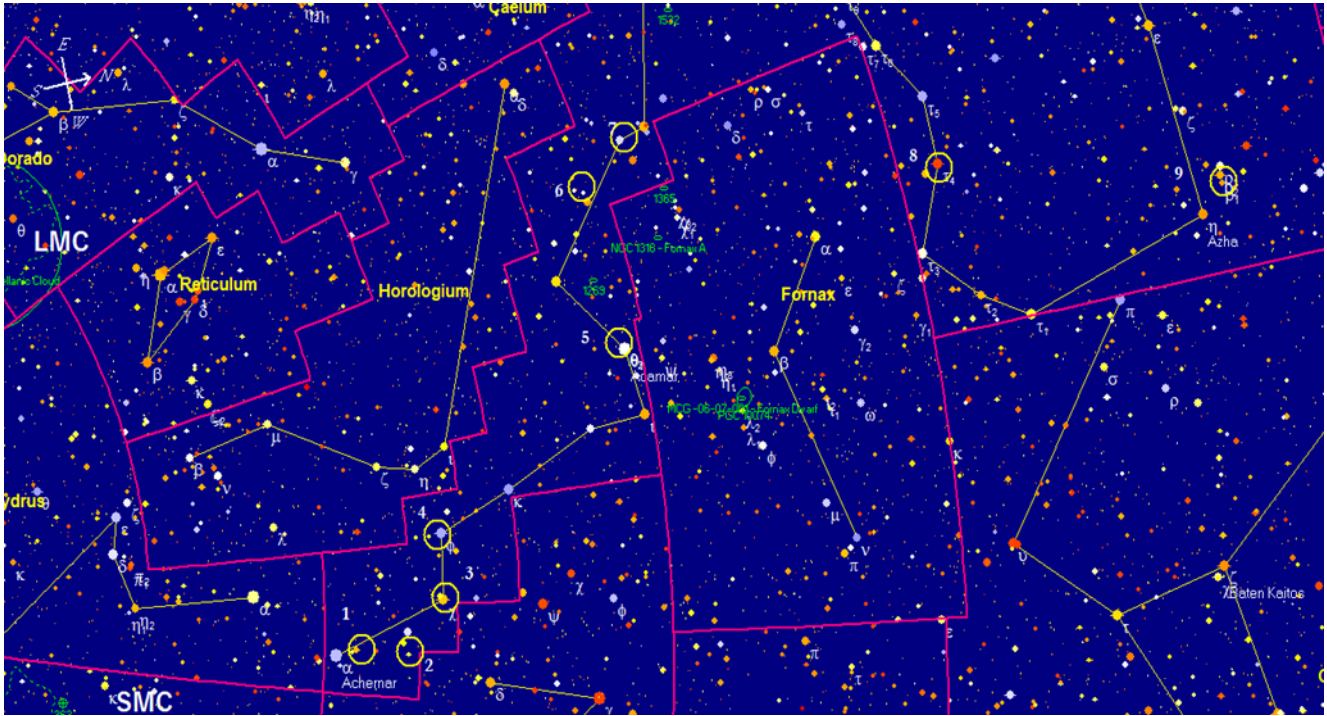


## Sky Objects By Eugene O'Connor

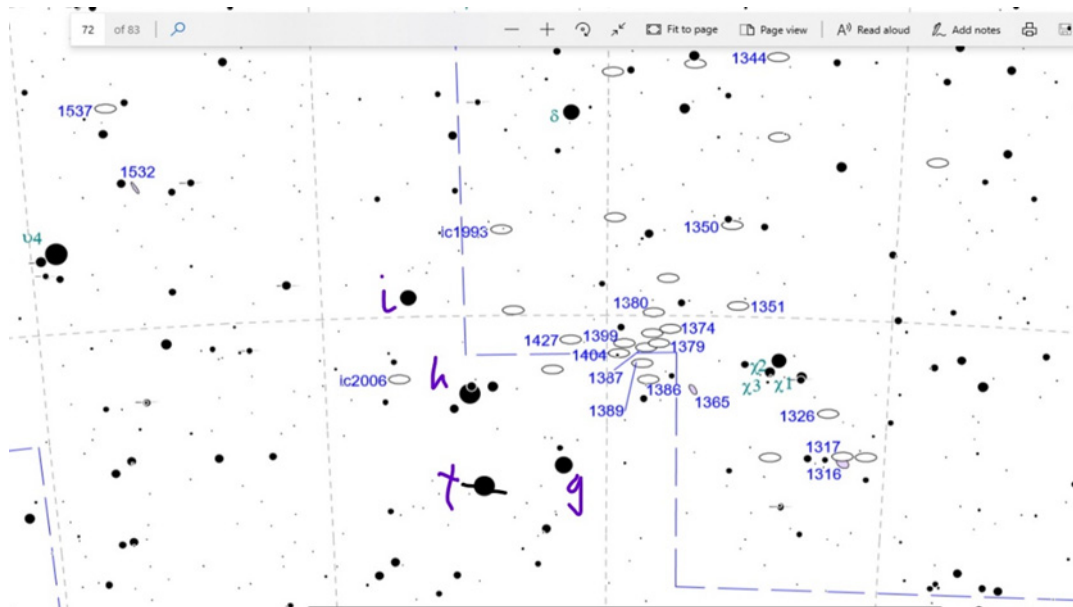
Cont...3

9 ρ 2 Eri. RA 3hr.03'. Dec. -07°41'; 5.3/9.5; (1.8"). This star lies in a line of three mag 5 stars: p1, p2, and p3. The separation is tight, and the primary is deep yellow.

*While in the vicinity of Eri, if your scope is 8" or above, use low power to sweep a few degrees NW to observe the rich Fornax galaxies, where on best nights up to six can be spotted at once in a low power field. See map 3 below.*



Map 2, SE section of the constellation Eridanus; Double stars numbered and circled.



Map 3

## Astro Events from Frank Gross

### NASA mission catches nearby asteroid ejecting material into space



By [Ashley Strickland](#), CNN

Updated 2003 GMT (0403 HKT) December 5, 2019

**(CNN)**NASA's OSIRIS-REx mission arrived at near-Earth asteroid Bennu a year ago, and the spinning top-shaped space rock has been full of surprises. The latest findings now classify it as an active asteroid with observable events happening on the surface.

OSIRIS-REx and Bennu got to meet face-to-face on December 3 of last year. OSIRIS-REx has been orbiting the asteroid, which is 70 million miles from Earth, since December 31, 2018. It's a "rubble pile" asteroid, a grouping of rocks held together by gravity rather than a single object.

The greatest surprise of the mission happened only a few days in, when an unexpected observation occurred that signaled activity on Bennu, the mission researchers said. They detected particle plumes ejecting off the surface on January 6, followed by additional smaller plumes on January 19 and February 19.

Before the close approach of the spacecraft a year ago, they couldn't be sure if there was any activity on Bennu. Now they know for certain, which makes Bennu an active asteroid that is regularly ejecting material into space. This is not only rare, but it's also the first time scientists have had close-up observations of particle plumes erupting from an asteroid's surface, NASA said.

## Astro Events from Frank Gross

Cont...2



GODDARD/UNIVERSITY OF ARIZONA/LOCKHEED MARTIN/NASA

Particles can be seen releasing from the asteroid.

The particles range from single-digit centimeters to tens of centimeters in length, and some of them are slow-moving while others are quickly making their way through interstellar space. Some fall back onto the asteroid's surface, while others go into orbit around it, like small satellites.

### A NASA mission's delicate dance to collect samples from a rugged asteroid

About a hundred particles were ejected during each event in January and February. All three events occurred in different, specific places on the asteroid. And they all happened during what could be called the late afternoon on Bennu. None of them posed a risk to the spacecraft. The researchers noted that they can't rule out possible ejection events that occurred before the spacecraft arrived at the asteroid in December 2018.



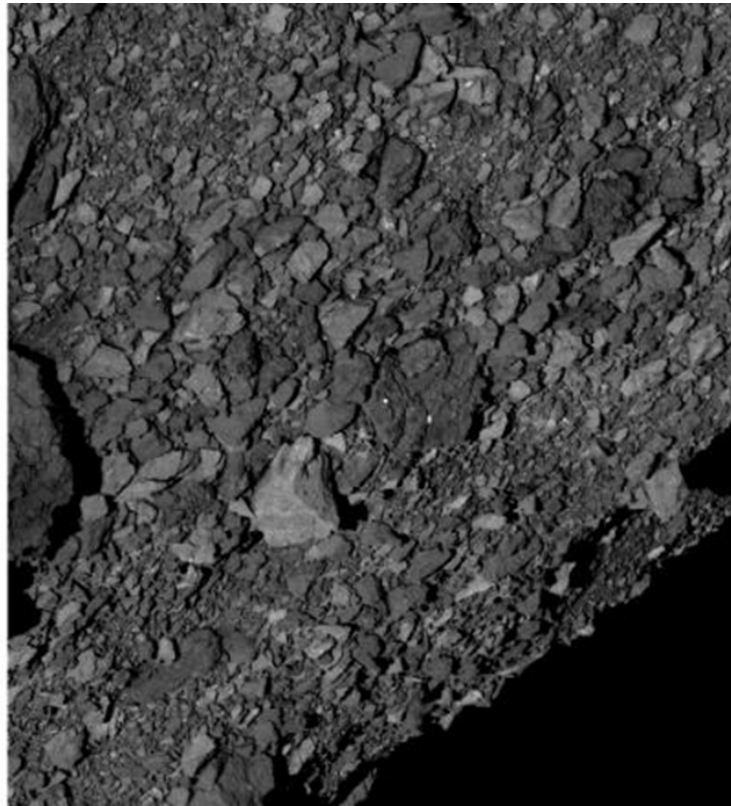
NASA/GODDARD/UNIVERSITY OF ARIZONA

They also spied persistent particles orbiting the asteroid, six of which they will target with future observations. "The discovery of plumes is one of the biggest surprises of my scientific career," said Dante Lauretta, OSIRIS-REx principal investigator at the University of Arizona, Tucson. Active asteroids can typically lose mass and eject particles through disintegration caused by unstable rapid rotations or ice sublimation -- but that wasn't the case here.



## Astro Events from Frank Gross

Cont...3

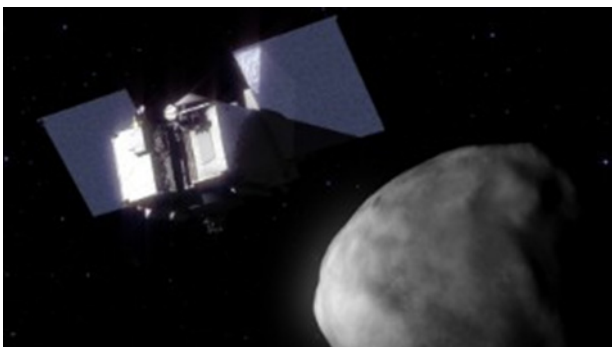


GOODHARD/UNIVERSITY OF ARIZONA/NASA

Bennu's surface is covered in boulders.

Instead, they believe the ejections are either being caused by micrometeorites impacting the surface; the loss of water molecules that are found within the hydrated minerals on the surface; or thermal stress fracturing of the asteroid's boulders, according to a study released in the journal [Science](#) on Thursday. All three of these causes could work together to cause the particle ejections as well, the authors said.

Bennu is covered in boulders rather than the large areas of fine-grain material that scientists expected. And OSIRIS-REx's instruments have confirmed that hydrated minerals, including magnetite, are abundant and widespread on the asteroid.



### NASA's spacecraft is orbiting closer to an asteroid than ever before

Bennu's surface experiences extreme temperature variations over its 4.3-hour retrograde rotation period, sometimes by as much as 100 Kelvin, according to the study. When two of the events were observed occurring at the mid-latitudes of the asteroid, the temperature varied from 250 Kelvin to 400 Kelvin. Given that the late afternoon timing is consistent for all three events, the researchers believe the temperature swings are causing thermal fracturing.

on it, could find their way to Earth.

Some of the particles that escape the asteroid, only to fall back

## Astro Events from Frank Gross

Cont...4

Since arriving at the asteroid Benu, OSIRIS-REx has been mapping its surface to determine the best spot to collect samples in 2020. This will be the first NASA mission to return samples collected from an asteroid, and the samples are expected back on Earth in 2023.

### Water found on asteroid by OSIRIS-REx explorer

The asteroid is full of valuable materials that may even contain clues about how life began. Asteroids could even serve as fuel stations for robotic and human missions if we can unlock the hydrogen and oxygen inside them, NASA said.

It's also older than expected, between 100 million and one billion years old, and likely originated in the main asteroid belt. Benu probably broke off of a larger asteroid in the belt between Mars and Jupiter a couple billion years ago. This knocked it through space until an orbit close to Earth locked it in place.

Benu is the smallest body to ever be orbited by a spacecraft, just a little bit wider than the height of the Empire State Building, according to NASA.

The mission -- which stands for Origins, Spectral Interpretation, Resource Identification, Security-Regolith Explorer -- launched in September 2016 and is spending two years up close and personal with Benu.

The sample from Benu could help scientists understand not only more about asteroids that could impact Earth but also about how planets formed and life began.

The asteroid could pass closer to Earth than the moon in 2135, with even closer approaches possible in 2175 and 2195. A direct hit is unlikely, but the data gathered during this mission can help determine the best ways to deflect near-Earth asteroids.

A meteor streaks past the constellation Orion, the hunter, as it hovers over the horizon. The bright, ruddy star Betelgeuse (left) is part of this famous stellar pattern.

PHOTOGRAPH BY BABAK TAFRESHI, NAT GEO IMAGE COLLECTION  
[SCIENCESTARSTRUCK](#)

A giant star is acting strange, and astronomers are buzzing

**The red giant Betelgeuse is the dimmest seen in years, prompting some speculation that the star is about to explode. Here's what we know.**



BY [NADIA DRAKE](#)

PUBLISHED 26  
DEC 2019

## Astro Events from Frank Gross

Cont...5

**THE CONSTELLATION ORION** is one of the most recognizable patterns in the night sky, visible around the world. But if you've looked at Orion recently and thought something seemed off, you're not wrong: The giant red star Betelgeuse, which marks the hunter's right shoulder, is the dimmest it's been in almost a century. Normally, Betelgeuse is among the 10 brightest stars in the sky. However, the red giant [began dimming in October](#), and by mid-December, the star had faded so much it wasn't even in the top 20, Villanova University's [Edward Guinan](#) reported [in an Astronomer's Telegram](#). "Now the outline of Orion is noticeably different with Betelgeuse so faint," he says. ([See how many constellations you can identify with our interactive quiz.](#))

## STARS 101

Countless stars dot the night sky. Learn how these celestial objects form, how they are classified by brightness and temperature, and what happens when stars die.

To be clear, dimming alone isn't all that odd for a star like Betelgeuse. It's what's known as a variable star, and its shifts in brightness have been closely studied for decades. However, it is unusual for one of the sky's most prominent points of light to fade so noticeably, prompting scientists to consider the possibility that something more exciting could be about to happen: Betelgeuse might explode and die, briefly blazing [brighter than the full moon](#) before vanishing from our night sky forever.

Huge, red stars like Betelgeuse live fast and die violently, exploding in stellar events called [supernovae](#) that are visible across vast distances. So, while Betelgeuse is a relatively young star—[only about 8.5 million years old](#)—astronomers know that it is nearing the end of its life.

"The biggest question now is when it will explode in a supernova," UC Berkeley's [Sarafina Nance](#), who [studies Betelgeuse](#) and stellar explosions, [said on Twitter](#). "Disclaimer: I don't think it's going to explode any time soon," she added during an interview with National Geographic. "But I am excited [for] when it does."

### What do we know about Betelgeuse?

The supergiant star's formal moniker is derived [from a mistranslated Arabic name](#) meaning "the hand of Orion" (*yad al-jauza*). Today, many people pronounce the name like the titular character in Tim Burton's 1988 film *Beetlejuice*. The star is also referred to as Alpha Orionis, a designation normally reserved for the brightest star in a constellation, even though [Rigel, at Orion's left foot, is actually brighter](#).

Betelgeuse is huge and bloated, wielding 20 times the sun's heft. If you swapped out the sun [and replaced it with Betelgeuse](#), the red star would swallow Mercury, Venus, Earth, Mars, the asteroid belt, a couple of spacecraft, and maybe Jupiter; Saturn would suddenly be quite toasty.

It's also relatively close to our solar system, in cosmic terms, estimated to be [in the neighborhood of 600 light-years away](#). So, when this star detonates, the explosion will be bright enough to cast shadows on Earth at night and will be visible during the day for a few months, at least. Then, the star will fade from our sky.

### What'll happen to us when Betelgeuse blows?

Nothing. Even though Betelgeuse is nearby in astronomical terms, it's nowhere near close enough for the explosion to affect life on Earth. Astronomers calculate that it'll take [about six million years](#) for the shock wave and any cold, diffuse debris to reach the solar system, and even then, the sun's protective bubble will shield us from the splattered star guts.

Instead, once astronomers see that Betelgeuse is going to go supernova, you should get to a clear northern sky as quickly as possible and enjoy the show.

"It would be so incredibly cool!" Nance says. "By far and away the most incredible thing to happen in my life."

Cont...6

### **So, is that actually about to occur?**

This is the big mystery, and it's one of the reasons why the star's current behavior is intriguing. Scientists suspect that a precipitous drop in brightness could portend a star's demise.

"As massive stars near the end of their lives, they experience insane and violent mass loss," Nance says. In theory, all that ejected dust could shroud and darken the nearly dead star, causing it to dim from our perspective right before it goes supernova. In practice, though, it's not yet certain whether stars are darkest before they blow—no one has yet been able to closely study a doomed star before, during, and after its demise.

### **But isn't it normal for Betelgeuse to be dimming?**

Yes. Betelgeuse is classified as a semiregular variable star, meaning that its brightness semiregularly changes. Millennia ago, Australian Aborigines [noted the star's fluctuating luminosity](#), and British astronomer John Herschel recorded the phenomenon [in 1836](#).

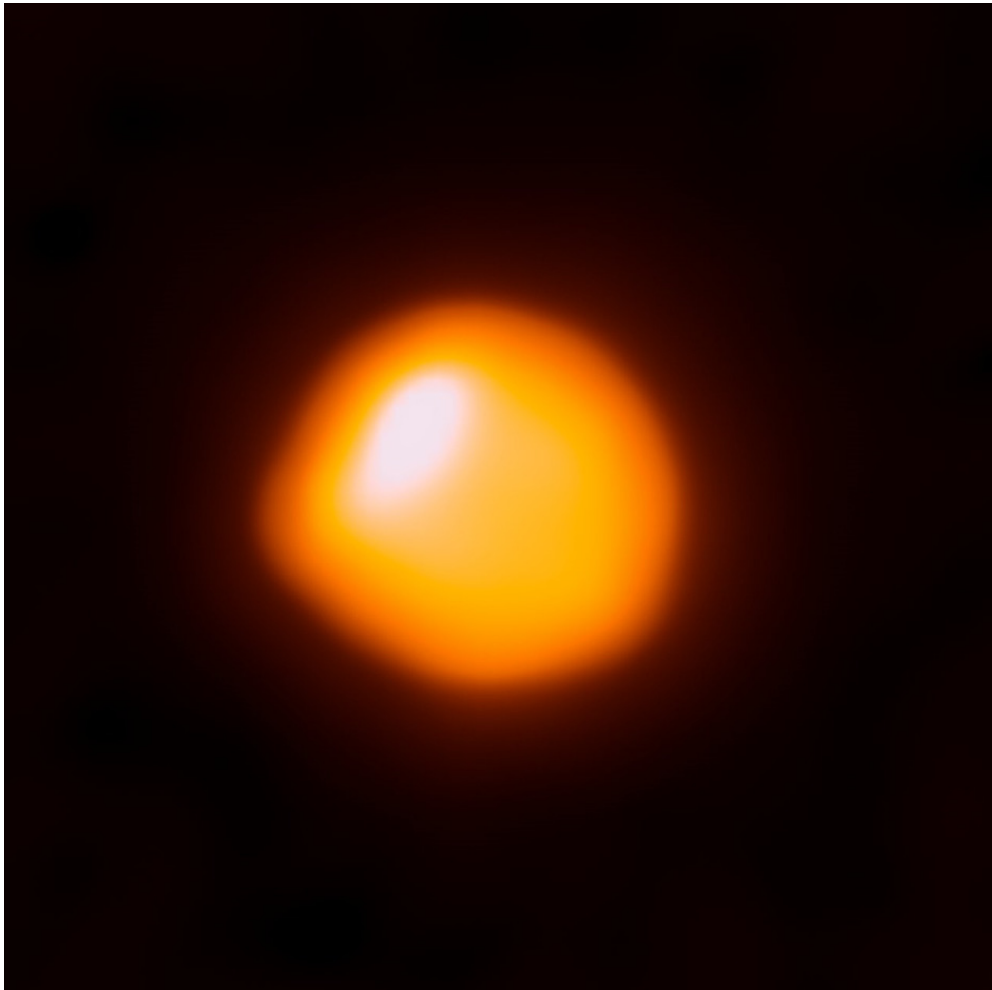
More recently, the [American Association of Variable Star Observers](#) has been compiling observations of Betelgeuse's fits and starts. [Decades of photometric data](#) show that Betelgeuse [brightens and dims in cycles](#), with one notable cycle vacillating on a roughly six-year timescale, and another rising and falling every 425 days or so.

"The star is not strictly periodic, and the range of light variations changes from cycle to cycle," Guinan says, noting that right now, Betelgeuse is the dimmest it has been since more precise monitoring began around a century ago; the second-duskiest observations on record date back to the mid-1920s.

The reasons for these quasiperiodic changes in variations are somewhat unclear. Guinan and others say that supergiant stars like Betelgeuse have mottled surfaces containing massive convective cells that shrink and swell, which cause such stars to darken and brighten, but that's not the whole story.

"[Images of Betelgeuse](#) show bright and dark features on its surface, and at times it is not symmetrical," Guinan says. "The star is bloated and unstable, with pulsations, as well."

Cont...7



**The star Betelgeuse, as seen from Earth by the ALMA observatory in Chile.  
IMAGE BY ALMA (ESO/NAOJ/NRAO)/E. O’GORMAN/P.  
KERVELLA**

Guinan suspects that Betelgeuse is dramatically dimmer now because two of its cycles are overlapping at minimal brightness. In essence, the star is approaching the dimmest points in both its six-year and 425-day cycles, an intersection that makes the star’s normal fluctuations appear much more sinister. After looking through 25 years’ worth of prior data, Guinan suspects that the star will continue to fade for another couple of weeks before gradually turning back on.

But, he says, “if it keeps getting fainter, then all bets are off.”

Cont...8

### **How long do we have to wait for the fireworks?**

Recent studies suggest that the star will most likely explode within the next million years, and perhaps as soon as [100,000 years from now](#). Or ... maybe Betelgeuse has already exploded and we have not yet seen it happen.

It takes light from this star about 600 years to reach us, meaning that we're actually observing the star as it was 600 years ago. If we do see it detonate in our sky any time soon, that means the star actually blew up sometime during the European Middle Ages, and light from the blast is just reaching Earth.

Either way, scientists are excited to keep watch on Betelgeuse and see what sorts of surprises the star still has in store. "It's actually quite rare to study a star this well pre-explosion, whenever that happens," Nance says. "This will inevitably yield cool and interesting ideas for what happens to stars right before they explode."



## The LMC: 'A Mud Map' 3 by Harry Roberts

In '**Mud Map 3**' we complete our task of locating and naming (in small bino's) the main regions of the LMC. We will use region names in use in the science community- but not widely known.

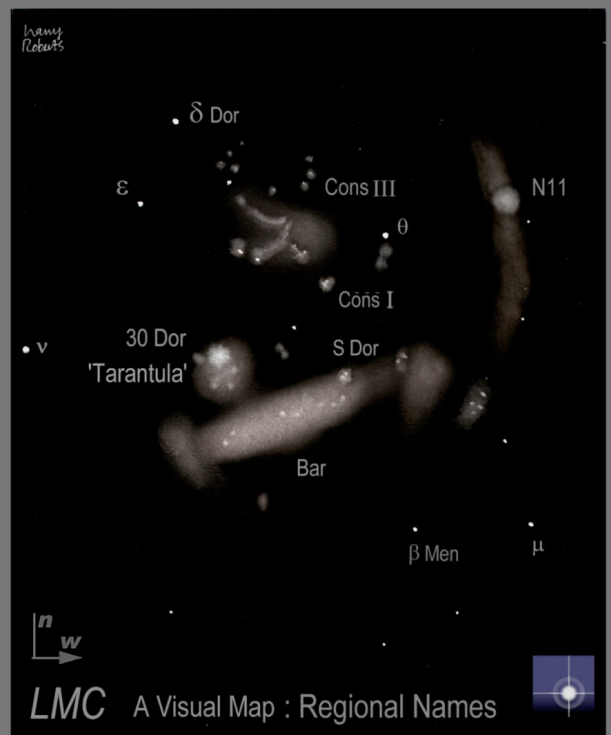
**Why?** Unlike our rather quiet Galaxy, gravitational interactions 'renewed' the Clouds ~30-100Ma ago, resulting in myriad rich and complex formations- and the need for many 'tags'. Some carry more than a dozen from various catalogues! A daunting task for 20thC mappers and amateurs! (Kay, J. in her 2001 "Visual Atlas" describes some 300 NGC objects in the Large Cloud!)

Recent authors have revived Shapley's Constellations to describe large-scale features of the LMC - and it's useful if we do the same. However, the few current names, 30 Dor, Tarantula etc. we retain.

To recap: we earlier noted that the LMC is much bigger than its two well-known bits, the '**Bar**' and the '**Tarantula**' or '**30 Dor**' Nebula (Mudmap Fig.)

### LMC *A Visual Map for Binoculars:*

LMC 1967 50mm B&W film



We noted a big detached 'bit' well west of the Bar catalogued as "Henize 11", a rare 'super-bubble' of star-formation charted by astronomer Karl Henize as **N11**. 'N' is not 'NGC', but denotes an object in his 1956 catalogue and is widely used in research. Let's use this notation! You will see N11 in small binos'. In a mid-size 'scope we are shocked to see a "super-bubble" with many activity centres: clusters, nebulae, the works! (Wiki the full story!)

## The LMC: 'A Mud Map' 3 by Harry Roberts

Cont...2

We also located an important cluster and nebula in the LMC 'Bar' named for variable star '**S Dor**'. It comprises the variable and several clusters and nebulae: a superb bright complex in 'scopes from 8in and bigger. New Territory. One degree north of 'S-Dor' we find another such complex, with many NGC numbers and several N44 (Henize) numbers! This is another remarkable LMC 'super-bubble' complex. We may call it NGC1929 etc, yet a common name is needed: and is available!

**Constellation I.** Shapley in the 1930's dubbed this LMC object "Constellation I" (Roman numeral) an ideal name that we will revive! Point your bigger 'scope at it and again a 'super-bubble' appears plus multiple HII nebulae and OB clusters. Due to its complexity, nine different numbers from 3 catalogues are in use for 'Constellation I'!

**Constellation III.** We now confront the biggest challenge: "The Dragon"!

When the writer first imaged the LMC (1967), filament structures strewn over a vast area were recorded 3 to 4 deg N of the LMC Bar. They remain 'unmapped' today it seems! When recently sketched in a rich-field 10inch, they were called 'blue-filaments' for want of any catalogue name! 'Blue', for their brightness in H-Beta! (Itself a rarity! Likely they are LMC 'arms' gravitationally distorted.)

In a recent paper on LMC age-regimes Shapley's "Constellation III" was revived by the authors and we use it here as, it seems, no other catalogue recognises the features or the region!<sup>1</sup> However "Dragon's Head" is in amateur use for the group of nebulae NGC2029, 32, 35 and 40 – that are wonderfully dragon-like, at the 'head' of the sweeping "blue filaments": the writhing "Dragon's" body? It's wonderful in the eye-piece! Hence, we suggest **Const. III**<sup>3</sup>, aka "Dragon" for 'short'!

Only if a large complex has no common name - just several catalog tags - is a new name suggested. Recall we dubbed the isolated bright complex west of the LMC **N11**, a memorial for astronomer/astronaut Karl Henize. But to apply N numbers throughout would leave us just as confused since 'N' numbers apply to nebulae only, and supplement the old NGC system.

**Arms.** The LMC Bar has an arm trailing at each end: the short SE Arm and the longer brighter NW Arm. **N11** lies half way along the latter. While faint, the useful terms 'NW Arm' etc. are in current use, and we retain them.

Our 'revised' LMC region names are now completed (Mudmap); find them in 'scopes great or small and treats abound! No complex NGC tags needed! Explore the 'Clouds'. Clear skies!

<sup>1</sup> Harris, J. And Zaritsky, D. "Star Formation History of the LMC".

<sup>2</sup> Kay, J "A Visual Atlas of the Magellanic Clouds". Kay J. & Webb Soc.2001.

<sup>3</sup> Shapley 'II', 'IV' and 'V' are parts of the 30Dor complex, the main Bar or a minor group of historic interest only. Common names are retained.

## More Club News continued from page 1

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

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

The Committee: Robert Turnbull, Rudolf Henssen, Robert Spruyt, Chris O'Hanlon, John Gould, Ernest Royston, Anthony Peters

**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.