

Society News

A Big Apology

This NZ is very late and much smaller than usual. I am sorry but at this time of year my normal daytime work gets extremely busy - this month it's really got in the way and, for the first time in my editorship, I have to admit defeat.

I am very sorry about this but I will be issuing a bumper issue in August (*my last NZ!*).

Tonights Talk

To learn about variable stars, including the enigmatic Betelgeuse, join the VAS monthly talk for 28th July, when VAS Chairman Bryn Davies will be giving us a presentation "Variable Stars", in person at Newchurch Pavilion.

Events

The **Garlic Festival** is a major fund raising event for us as we are paid for providing site marshals over the weekend. This years dates are Saturday & Sunday 19th - 20th August.

The **Wolverton Manor Garden Fair** takes place on Saturday & Sunday 2nd - 3rd September 2023. VAS will have a stall alongside the AONB.

Please contact Richard Flux if you can help with either.

August AGM

It's only a of months until our AGM and your chance to join the VAs committee.

At the moment two committee vacancies are available

1. Committee Secretary
2. New Zenith Editor

An application form is attached to the this New Zenith.

Brian Curd

VAS Website: wightastronomy.org

Submissions or letters to New Zenith are always welcome and should be sent to:

The Editor, New Zenith
Belvedere

St John's Crescent

Sandown

Isle of Wight

PO36 8EE

Tel: 07594 339950 or email: editor@wightastronomy.org

Material for the next issue by the 6th of the month please.

The Vectis Astronomical Society and the Editor of the New Zenith accept no responsibility for advice, information or opinion expressed by contributors.

Registered Charity No 1046091

Observatory Diary

Monday, 19.30hrs	Members Only and by arrangement Telescope and night sky training.
Thursday	Members (19.30hrs) and Public (20.00hrs). Informal meeting and observing

VAS Website: wightastronomy.org

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2023 Monthly Meetings

Check <http://www.wightastronomy.org/meetings/> for the latest information

Date	Subject	Speaker
28 Jul	Variable Stars	Bryn Davis
25 Aug	AGM	Meeting in the Observatory
22 Sep	ZOOM Only Celestial Hide and Seek Eclipses, Transits and Occultations	Martin Lunn
27 Oct	ZOOM Only The Great Debate (The Shapley-Curtiss Debate of 1920)	Nick Hewitt
24 Nov	EM-bridge technology and applications	Alan Thomson
2024 Monthly Meetings		
2024 26 Jan	GW Astronomy - Updates from the LIGO/Virgo/ KAGRA 4th Observing Run	Dr Laura Nuttall

Observatory Visits Booked

No bookings so far

**Please phone me for the current situation
(number on the front page)**

It would be appreciated if members could avoid using the observatory at these times.

GDPR rules mean we must maintain accurate membership records, please tell us if your contact details change

VAS Contacts 2023

President	Barry Bates president@wightastronomy.org
Chairman	Bryn Davis chairman@wightastronomy.org
Secretary	Vacant secretary@wightastronomy.org
Treasurer	Stewart Chambers treasurer@wightastronomy.org
Observatory Director	Brian Curd director@wightastronomy.org
Programme Organiser	Simon Gardner progorg@wightastronomy.org
Astro Photography	Simon Plumley ap@wightastronomy.org
Outreach	Elaine Spear outreach@wightastronomy.org
Membership Secretary	Mark Williams members@wightastronomy.org
NZ Editor	Help Wanted editor@wightastronomy.org
NZ Distribution	Brian Curd distribution@wightastronomy.org
Others	Dudley Johnson

Important

Members using the observatory **MUST** enter a line or two in the Observatory Log Book.

On several occasions, lights, heaters and the Meade LX200 have been left on!

When leaving, please ensure all is secure and all lights, heaters and telescopes are **TURNT OFF**.

Recycled Star Dust

A Review of "The Lifecycle of Stars"

The VAS public talk for June 2023 by Dr Elizabeth Cunningham

Why was a nuclear physicist giving an astronomy talk? Dr Elizabeth Cunningham of the University of Surrey explained: all the light we see from stars is generated by nuclear reactions in their core. And those processes are the engine that makes all the elements. In other words, we are made of star stuff. To understand how this works requires knowledge of all the stages of a star's life - birth, growth and death - but of course the timescales are immensely longer than a human lifetime, so the study of stellar evolution means looking at populations of stars at all different ages.

An example of star birth is seen in the Carina Nebula, the spectacular cloud of dust and gas in the Southern hemisphere sky, which is a site of new star formation. The dust and gas begin to clump together by gravity, which releases gravitational potential energy. This continues to heat up until a sufficient pressure and temperature is reached in the core to start nuclear reactions - this is a "new-born" proto-star. Primarily this will fuse hydrogen nuclei (1 proton) into helium nuclei (2 protons and 2 neutrons), releasing energy. This is the light and heat which in our sun, sustains life on Earth. One audience question asked about the "power density" of a star like our sun brought out an amazing fact: the power being produced in 1 cubic metre of the Sun is about as efficient as your garden compost heap! It is just that stars are so unimaginably huge that they produce vast amounts of energy.



Figure 1 - The "Cosmic Cliffs" of the Carina Nebula [image by NASA; ESA, and CSA (Canadian Space Agency)]

The nuclear reactions also balance the continued gravitational collapse of the new star (by "radiation pressure" and some quantum effects) in a hydrostatic equilibrium, at which point they enter what is called the Main Sequence of the population of stars. Some are big and bright, others smaller and longer lived. Elizabeth showed images of the bright white "teenager" stars in the Pleiades cluster, the "Seven Sisters" in Taurus. Sol, our Sun, is cosmically "middle-aged". In this state, stars can continue for billions of years until the fuel starts to run out. That is when things get very interesting...

In stars as big as, say, the red super-giant Betelgeuse in Orion (over 10 times more massive than our Sun) as the hydrogen starts to run out, gravity begins to win and the core, which by now is richer in helium, collapses and gets even hotter and denser. So hot, in fact, that helium starts to fuse into Calcium, to make a new equilibrium. This cycle may continue through a series of stages so that Hydrogen → Helium → Calcium → Neon → Oxygen → Silicon → Iron. But Iron is the end point, because it has the most energy-stable nucleus. So how do we get the heavier elements in the periodic table?

Stars that Go Bang in the Night!

When the fuel runs out, there's trouble ahead for a tired old star. For a star bigger than about one-and-a-half times the mass of the Sun, there will be an explosive end. Various types of supernovae may shine brighter than a galaxy for a short time. In the year 1054, a new "star" appeared in the sky which shone bright enough to be seen during the day! One result of this cataclysmic event is an unimaginably dense neutron star. But the more visible remnant is the beautiful Crab Nebula. The explosion of a supernova produces such extreme conditions that the spent nuclear fuel in the star's core is crushed into new elements heavier than iron. This enriches the "star dust" that makes up a nebula, and this in turn becomes the raw material to be recycled into a new generation of stars.

Elizabeth and her fellow nuclear physicists study what goes on by recreating these extreme conditions in labs around the world, including CERN in Switzerland.

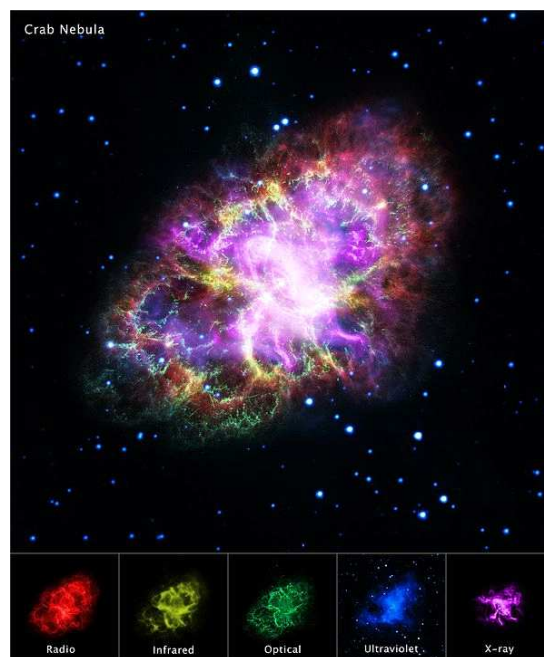


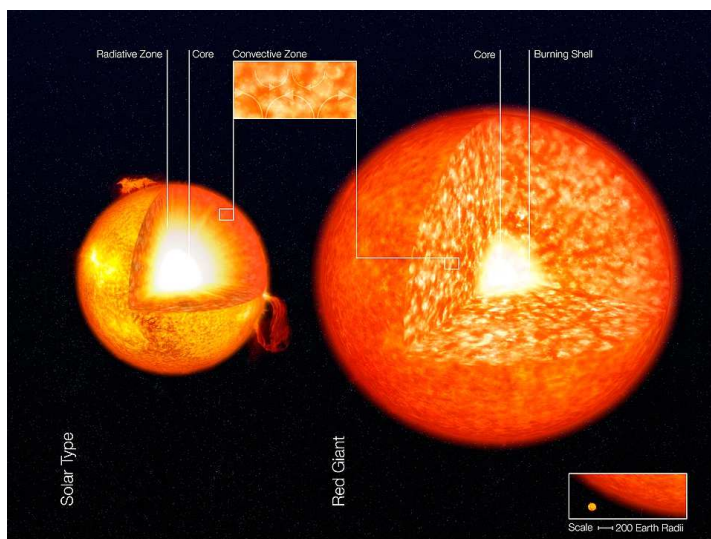
Figure 2 - The Crab Nebula [image by NASA, ESA, etc.: see https://en.wikipedia.org/wiki/Crab_Nebula for credits]

Choose Your Apocalypse

Finally, we heard about several possible futures for the Solar System. There is bad news and good news: the bad news is that the Sun will become a Red Giant star and life on Earth will end. But the good news is that it is unlikely to happen until about 5 billion years in the future.

There are 4 possible outcomes when the Sun expands, but none of them are good:

- The Earth is immediately destroyed; or
- The Moon's orbit is disrupted and decays, to finally crash into the Earth; or
- The Earth's orbit decays and crashes into the core; or
- The Earth's crust and mantle are stripped away



The devilish details may be uncertain, but the hellish outcome is the same. At least humanity has a few billion years to find a second home. Elizabeth recommends one of the moons of the outer planets, specifically Titan, the largest moon of Saturn. It's got water, it has an atmosphere, it has a magnetic field. That means Titan has some of the essentials for habitation, but any estate agent would have to point out that it needs a lot of work.

The lifecycle of stars has created the stuff we are made of, but in the end, it will consume the Earth and drive us out. Whatever humanity becomes in billions of years from now, can "we" find a new home?

Elizabeth recommends a video showing the astonishing views of Titan from the Huygens probe landing on Christmas Day 2004: What Huygens Saw On Titan - New Image Processing - YouTube (<https://www.youtube.com/watch?v=9L471ct7YDo>)

This review of the June talk was prepared by Simon Gardner. If you have any feedback on the monthly public talks, topics you would like to see more or less of, or speakers that you could recommend, please contact Simon at progorg@wightastronomy.org

VAS Officers and Committee Nominations 2023/24

For those wishing to stand for election at the AGM of the Society to be held on Friday 25th August 2022 at 7.00pm in the Observatory.

Name and Address of Nominee:

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Standing For

- Chairman
- Treasurer
- Secretary
- Observatory Director
- Membership Secretary
- Programme Organiser
- General Committee
- NZ Editor

Proposed by:

Seconded by:

Signature of Nominee:

Notes

- The Committee meets once each month usually on a Thursday evening at 18.30 before the usual club night.
- No person can be elected to more than one position.
- Only adult fully paid-up members may stand for election (or propose or second).
- All completed nomination forms to be received by the Secretary at least 14 days before the AGM.