New Zenith

The Monthly Newsletter of the Vectis Astronomical Society

Vol 26 Issue 11 — December 2018 *When Printed, this Newsletter costs VAS at least £1*

SOCIETY NEWS

Unfortunately This May Be Your Last NZ

VAS Subscriptions were due 1 October.

Rates for 2018/19 are yet again unchanged at:	
Ordinary membership	**£30:00 pa**
Senior (60+)	**£24:00 pa**
Student (under 18 or in full time education)	**£12:00 pa**
Family (2 Adults and 2 children)	**£50:00 pa**

Payment may be made by Cash or Cheque payable to Vectis Astronomical Society at the Observatory or at Friday's talk.

Cheques may be sent to

The Membership Secretary
Foxgloves, 23 Woodland Grove
Bembridge
PO35 5SG.

If you have a Standing Order

Please check the amount as some members did not change their Standing Orders when the rates were changed in 2015.

If you prefer to pay by Bank Transfer the Account details are:

Vectis Astronomical Society
Sort Code 30 95 99
Account No 00037505

If you are not renewing your subscription please let the Membership Secretary know.

Brian Curd
Editor New Zenith

VAS Website: wightastronomy.org

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

The Editor, New Zenith
Carpenter's Cottage
Dennett Road
Bembridge
Isle of Wight PO35 5XF
Tel: **01983 872875** or email: **editor@wightastronomy.org**

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

Registered Charity No 1046091

Observatory Diary

Monday, 19.30hrs	Members Only and by arrangement Telescope and night sky training. Please contact Martyn Weaver 07855 116490
Thursday	Members (19.30hrs) and Public (20.00hrs). Informal meeting and observing

VAS Website: wightastronomy.org

Contents this Month

Monthly meetings are held at the Newchurch Pavilion next to the Observatory and start at 19.30 unless stated.

2018 Monthly Meetings

Date	Subject	Speaker
Check *http://www.wightastronomy.org/meetings/* for the latest information		
23 Nov	Noise Effects in Astronomical Processes	Dudley Johnson

2019 Monthly Meetings

Date	Subject	Speaker
Check *http://www.wightastronomy.org/meetings/* for the latest information		
25 Jan	TBA	TBA
22 Feb	Imaging the Sun	John Slinn
22 Mar	TBA	TBA
26 Apr	Can we Live on Mars?	Greg Smye-Rumsby
24 May	The Rise and fall of the Herstmonceux Observatory	Keith Brackenborough
28 June	Nuclear Physics - Life, the Universe and Everything!	Dr Elizabeth Cunnigham
26 July	Young Astronomers' Event	
23 Aug	AGM and Social Evening	
27 Sept	A transportable/deployable radio telescope for hydrogen line observation	Alan and Martin Thompson
25 Oct	Dark Skies Event	
22 Nov	TBA	TBA

Observatory Visits Booked

December	None Booked
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.	

VAS Contacts 2018/19

President	Barry Bates president@wightastronomy.org
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NZ Editor	Brian Curd editor@wightastronomy.org
Membership Secretary	Norman Osborn members@wightastronomy.org
NZ Distribution	Graham Osborne
Others	Mark Williams, Nigel Lee, Stewart Chambers, Elaine Spear

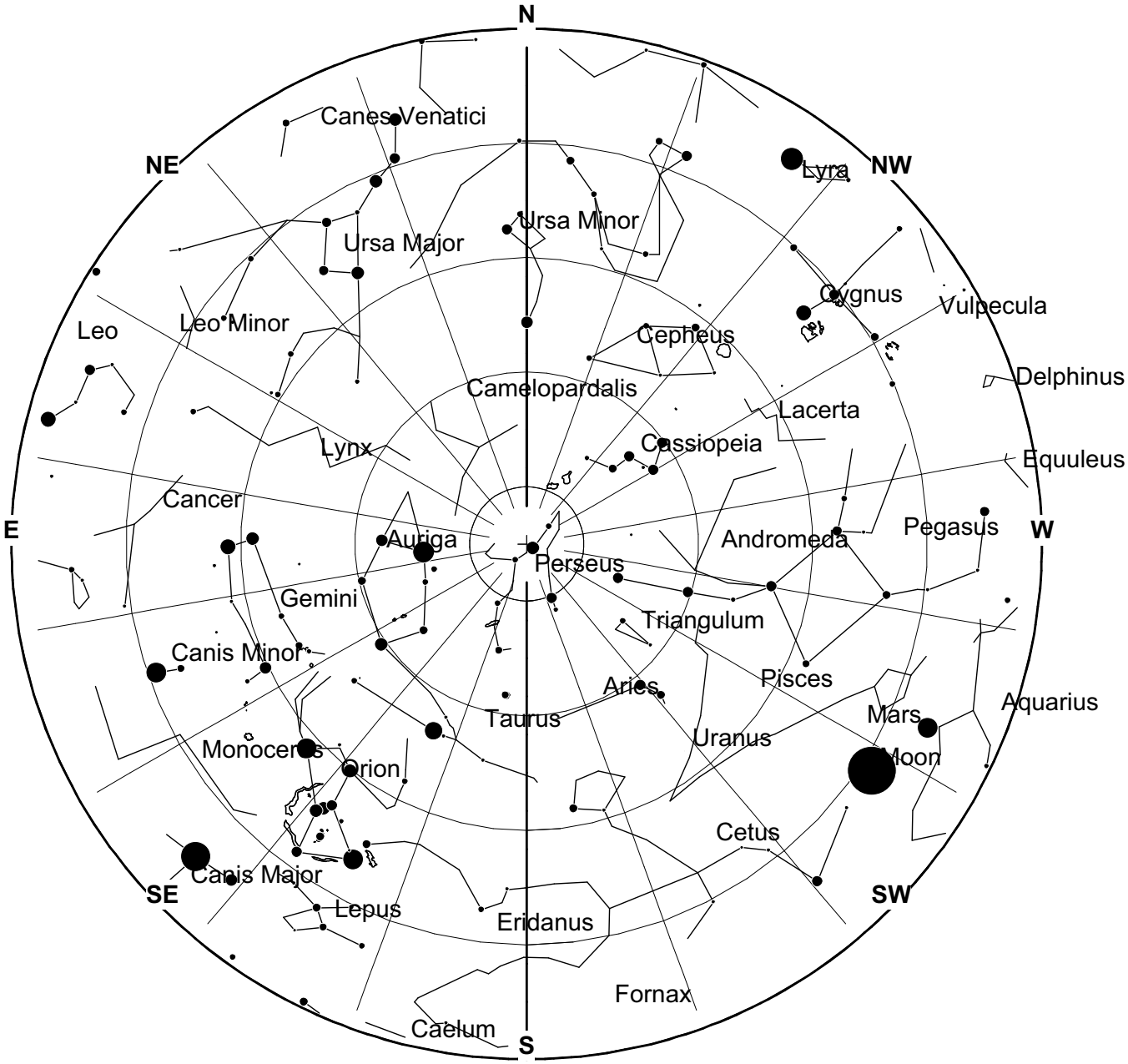
Important

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 TURNED OFF.

DECEMBER 2018 SKY MAP



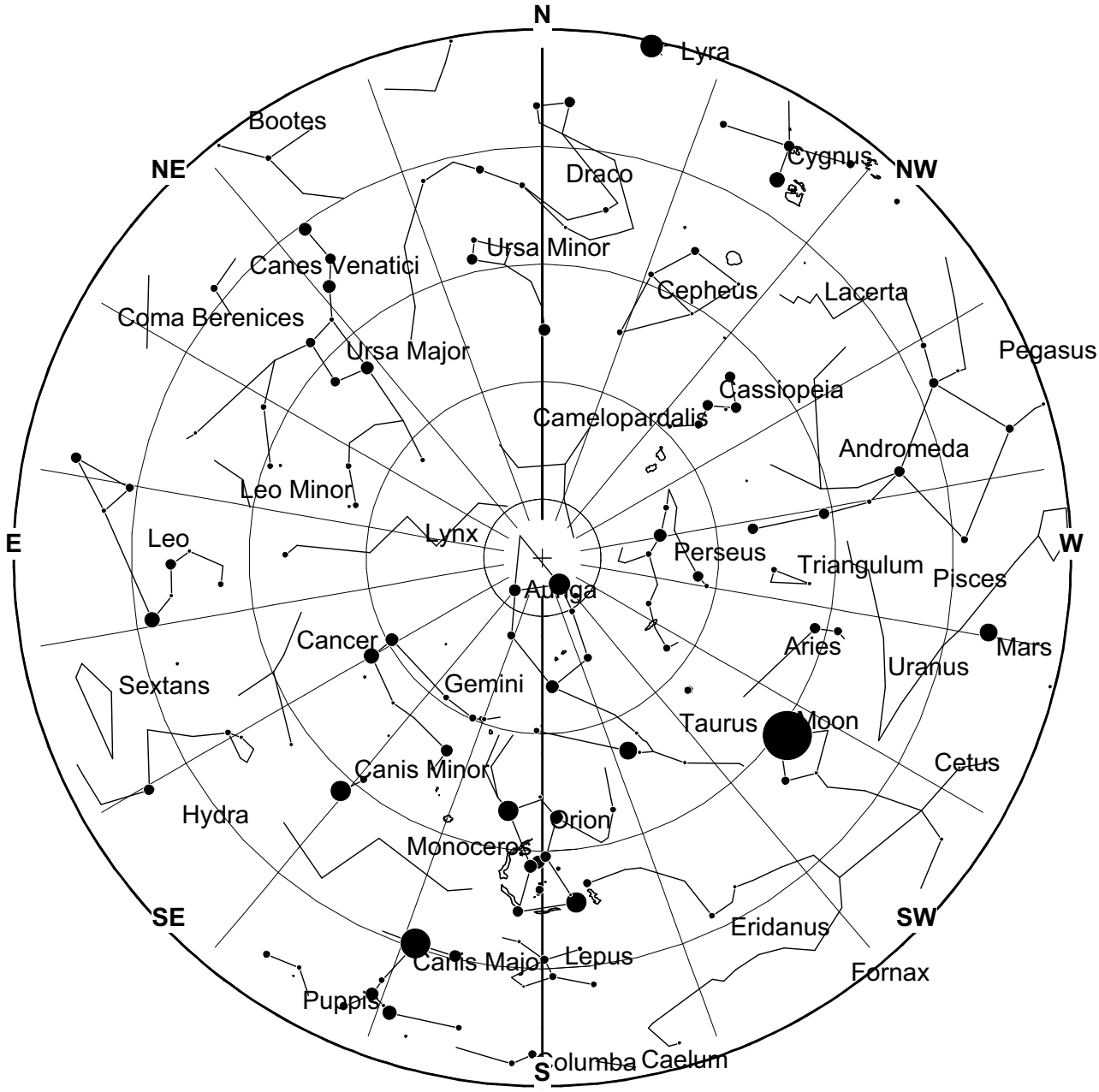
View from Newchurch Isle of Wight UK - 2200hrs - 15 December 2018

Messier 52 (also known as M52 or NGC 7654) is an open cluster in the Cassiopeia constellation. It was discovered by Charles Messier in 1774. M52 can be seen from Earth with binoculars.

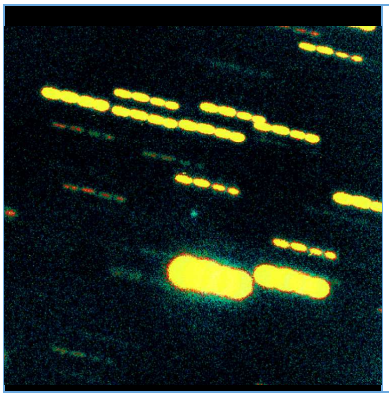
Due to interstellar absorption of light, the distance to M52 is uncertain, with estimates ranging between 3,000 and 7,000 light years. One study identified 193 probable members of the cluster, with the brightest member being magnitude 11.

Messier 52 is estimated to be about 35 million years old

JANUARY 2019 SKY MAP



View from Newchurch Isle of Wight UK - 2200hrs - 15 January 2019



46P/Wirtanen is a small short-period comet with a current orbital period of 5.4 years. It was the original target for close investigation by the Rosetta spacecraft, planned by the European Space Agency, but an inability to meet the launch window led to Rosetta being sent to 67P/Churyumov–Gerasimenko instead.[4] It belongs to the Jupiter family of comets, all of which have aphelia between 5 and 6 AU. Its diameter is estimated at 1.2 kilometres (0.75 mi).

DECEMBER/JANUARY NIGHT SKY

Winter Solstice

The winter solstice, the moment at which the Sun reaches it most southerly point occurs on December 21 at 10:23UT. After this time the Sun starts to head back towards the north.

Moon Phases

New	First Qtr	Full	Last Qtr
●	◐	○	◑
Dec 7th	15th	22nd	29th
Jan 6th	14th	21st	27th

Planets

Mercury

During Dec, Mercury makes a short appearance in the morning sky. In the run up to Christmas and just beyond, it slips down past the much brighter Jupiter which is rising higher each day. They are closest on the 21st and 22nd

Azimuth & Altitude of Mercury December 2018 at 07:30

Date	Az	Alt	Date	Az	Alt
7	133	10	19	137	9
9	135	11	21	137	8
11	136	11	23	136	7
13	136	11	25	136	6
15	137	10	27	135	5
17	137	10			

Venus

Venus can be seen as the Morning Star in the east before sunrise. From mid December it starts its descent back towards the Sun, but will still be visible until March. On the 23rd of Jan Venus and Jupiter are in close conjunction.

Mars

In the early evening throughout December and January Mars can be found in the southwestern sky. It is steadily fading and shrinking as it rises in the sky. By the end of January the surface markings will be getting quite difficult to distinguish.

Jupiter

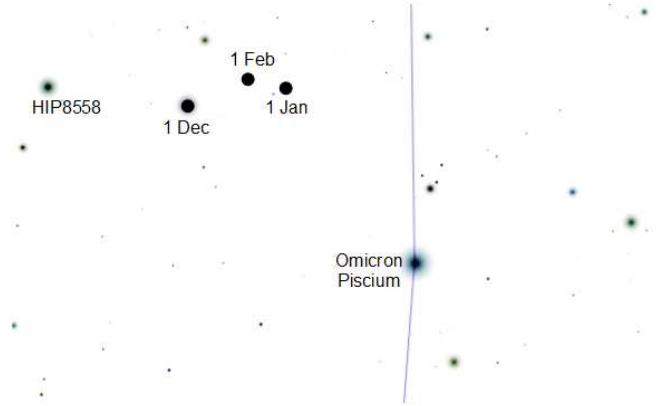
From mid December Jupiter can be found in the southeast before sunrise. By the end of January it rises at 04:30.

Saturn

During December Saturn may be glimpsed just above the southwestern horizon after sunset before disappearing behind the Sun and re-appearing in the dawn sky in January. It is now not favourable for observation until the spring.

Uranus

Uranus is located close to the 4th magnitude star Omicron Piscium. The finder chart shows star down to magnitude 8, and the position of Uranus on the first of each month. Uranus is magnitude 6.

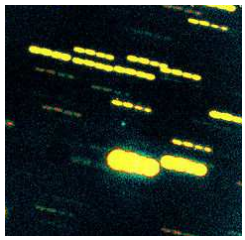


Position Of Uranus Winter 2018/19

Neptune

Neptune can be found in the constellation of Aquarius roughly midway between the stars Phi & Lambda Aquarii, close to the star 81 Aquarii. During January Neptune sinks towards the horizon and becomes unfavourably placed for observation

Comet 46P Wirtanen



If we are lucky we may get a Christmas present in the form of a naked eye comet. Comet Wirtanen is a periodic comet that passes through the inner solar system every 5.4 years, and this year passes close to the earth; at about the same distance as the orbit of Mars. It will race across the sky during the latter half of December passing from south to north. On the 7th it passes about a degree west of Azha in Eridanus and on the 17th it will be about 3 degrees east of the Pleiades at about magnitude 4; this should make a good photo opportunity. The 23rd and 24th sees it passing close by Almaaz and Capella in Auriga, now starting to fade as it continues north into Lynx where it slows down and starts to fade considerably.

Unfortunately the moon will be close to full when the comet should be at its brightest so washing out the spectacle somewhat. Comets are unpredictable so we may get anything from a barely visible fuzz ball to a newsworthy event.

Deep Sky

M52 The Scorpion Cluster
RA 23h 25m Dec 61° 37' mag 8.0

Follow the line from Schedar through Caph for 6 degrees beyond Caph and you will find this fine open cluster. It is large; almost half the size of the full moon and the density of stars makes it relatively bright such that it stands out from the background Milky Way. A telescope will resolve many of the cluster members. A chain of 11th magnitude stars form a hook shape that bears a passing resemblance to the tail and sting of Scorpius. Two other stars of similar brightness mark out the claws. The brightest star in the cluster, a red tinged eighth magnitude star is not actually a cluster member but a line of sight coincidence

NGC7789 Open cluster
RA 23h 56m Dec 56° 47' mag 6.7

Turn right at Caph instead of going straight on, and only go half the distance and you will find one of the oldest galactic clusters known. Slightly larger than M52 this cluster is home to about 1000 stars many of which can be resolved with a telescope. Being bright the cluster takes magnification well helping to show some of the dark dust lanes.

NGC1647Open Cluster
RA 4h 46m Dec 19° 7'

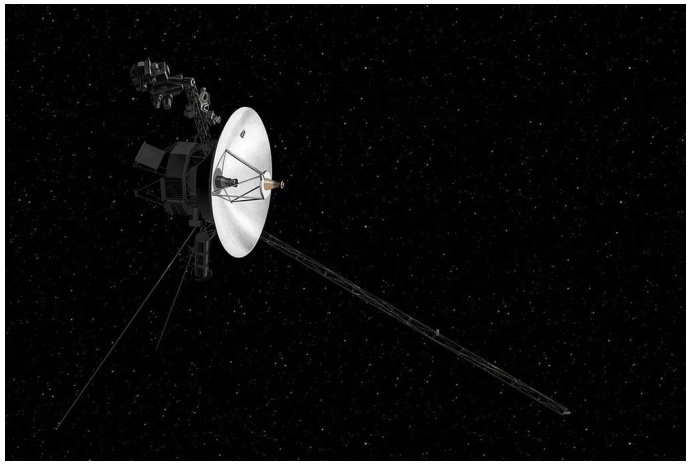
Scanning with a pair of 10x50 binoculars from Aldebaran towards Elnath, (the star often shown shared with Auriga) just as Aldebaran is leaving the field of view there in the centre should be a fuzzy triangular patch of stars about the same size as the full moon. This is NGC1647. Like many galactic clusters aperture is more important than magnification, an increased aperture will show more members of the cluster and allow them to be resolved whereas magnification will lessen the visual impact of the overall cluster.

NGC1746 Open Cluster
RA 5h 3m Dec 23° 45'

Continuing the journey from Aldebaran to Elnath, just past the halfway mark is NGC1746 a very large (1 degree diameter) very sparse cluster. There are a number of chains of stars of various colours, and in the centre of the group three of these chains make up what looks like a three bladed propeller that seems rather the worse for wear.

Peter Burgess

VOYAGER 2 CREEPS CLOSER TO THE EDGE OF THE SOLAR SYSTEM



An artist's depiction of the Voyager 2 probe traveling through our solar system. Credit: NASA

Going, going — nope, it's still just going, NASA says of its Voyager 2 probe, which the agency realized was approaching the edge of the solar system back in early October.

In a statement released yesterday (Nov. 14), NASA shared additional data from the probe that gives engineers a sense of where the spacecraft currently is in relation to the solar system.

The Voyager 2 probe, which launched in 1977, swung past the gas giants of our solar system, making this spacecraft the only device to gather detailed data about Uranus and Neptune. Then, its mission complete, Voyager 2 barrelled on, out toward the edge of our solar system.

The new data comes from an instrument called the Low Energy Telescope, which tracks the low-energy particles characteristic of our solar system. Given the data Voyager 1 sent home during its 2012 farewell, the team expects those encounters with low-energy particles to nearly disappear as the probe makes its exit, NASA said.

And at the beginning of November, the team noticed a sharp decline in the number of particles encountered — but not all the way down to nearly zero, where it will remain after it leaves our neighborhood. That means that the spacecraft still has a ways to go before scientists can finally declare it free of its home solar system.

The new data adds to the first warning of Voyager 2's impending departure, which came from the probe's High Energy Telescope, which measures high-energy particles. Those particles become more prevalent as a spacecraft leaves the solar system.

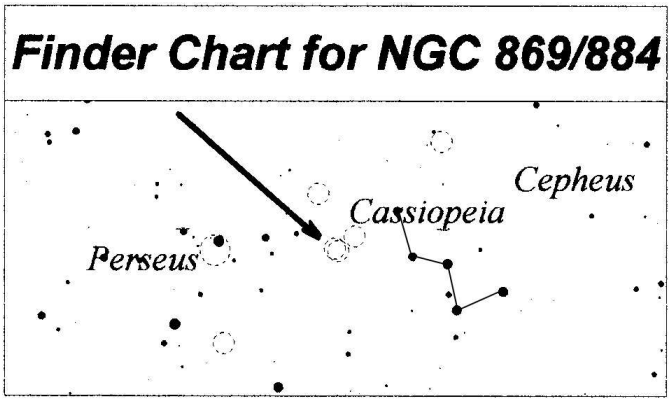
More at: https://www.space.com/

MY 100 BEST NIGHT SKY SIGHTS

Galactic Clusters

Coordinates: RA 02h 20m 42s, Dec +57' 08"

When is a star not a star? Answer - when it's a cluster. If that sounds peculiar let's remind ourselves how stars are identified. The main ones in each constellation are labelled with Greek letters, generally in descending order of brightness from Alpha to Omega. Some even less bright are assigned Roman letters. One could expect therefore that something called χ (***chi***, equivalent of our x) would be a fairly dim star and something named ***h*** an even dimmer one. Most times you'd be right, but not in Perseus, for in this constellation those two imposters are none other than the ***Double Cluster, NGC884/869***.



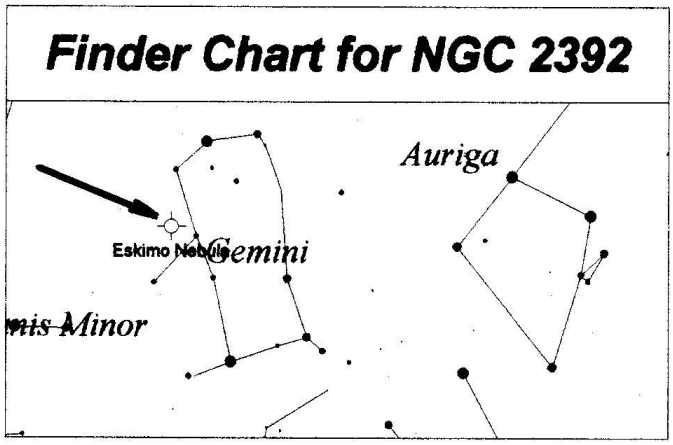
Two of the very few clusters that look really fine through binoculars they're easily visible to the unaided eye from October to December. With a telescope you'll need a wide-angle, low power eyepiece to see both at the same time and for once, the smaller the telescope the better. However, each looks great on its own, with over 200 stars mostly blue and white mag 8 or less, NGC869 being marginally more compact and sporting two bright, mag 6.5 stars dead centre. NGC884 has only one similarly bright star in its northern region but makes up for this by containing several red ones.

The spectacle is made complete by the backdrop, for the Double Cluster is seen against the myriad stars of the Milky Way and in large (20 x 80) binoculars and rich-field telescopes is a scene par excellence. Through my SCT at f6.3 and 40x the view is simply breathtaking - the VAS 18" Dobsonian should knock your socks off!

Planetary Nebula

Coordinates: RA 07h 29m 12s, Dec +20' 55"

Most planetary nebulae are either very dim, or very tiny although some have redeeming features such as M76 and M96 (dim) and NGC6543 and 6826 (small), all featured in earlier articles. ***NGC2392*** in Gemini is better than most. At mag 8.6 it's respectably bright and, at 44 arc seconds, a reasonable size in most telescopes - significantly larger than Mars at its best. If that's not enough to whet your appetite its relatively bright central star, at mag 9.8, is among the easiest to see of all planetaries giving this one an added attraction.

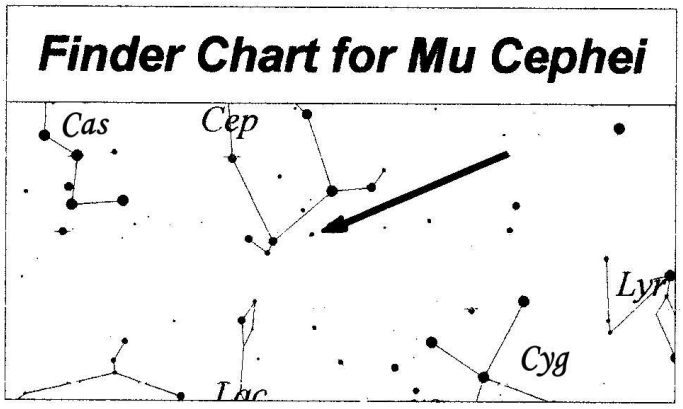


Despite these distinctive features NGC2392 can be difficult to recognise at the first attempt as, with low powers used for sweeping the sky, it can look like an out-of-focus star. Its colour gives it away however, an attractive blue-green, so during winter search the area east of the leftmost twin of Gemini (see Finder Chart) using a magnification of 60-100x and, when you find a fuzzy greenish spot reminiscent of Uranus or Neptune, change to a higher power. A 6" telescope will show the disk well but may not segregate the central star unless the seeing is good. An 8" will have no trouble showing the gap 'twixt star and shell and a 10" will do so even at moderately low powers.

Known as the 'Eskimo', this planetary purports to resemble a nose (the star) in the middle of a face (an inner shell) surrounded by a fur parka (an outer shell) as seen through large telescopes - well, some people have great imaginations.

Coloured Star

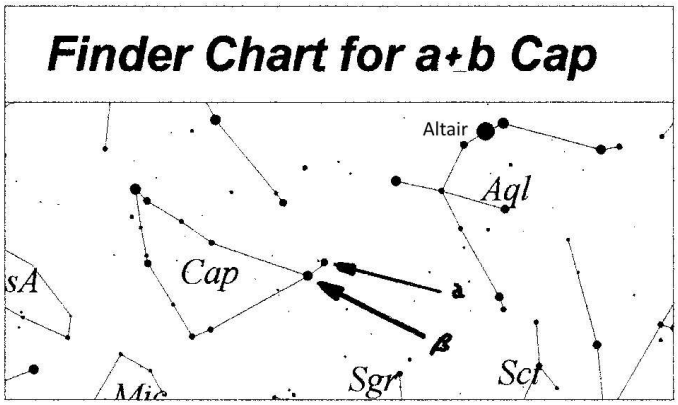
Coordinates: RA 21h 43m 30s, Dec +53' 47"



Whilst most stars appear white many exhibit various shades and intensities of blue, yellow and orange, but few are so startlingly coloured as ***Mu Cephei***. Found almost directly overhead in autumn Herschel's Garnet Star is a red supergiant - and it shows! A semi-regular variable, it's magnitude varies from 3.5 to 5.1 over a period of two years and, although this would lead one to expect it to be very bright when seen through the telescope, it's such a deep orange-red that it appears to be much dimmer. It's so totally alien for anything in the night sky to be this red, even through binoculars that it just has to be on your list of unmissables.

Multiple Stars

Coordinates:
RA 20h 18m 06s, Dec -12' 33"
RA 20h 21m 00s, Dec -14' 47"



Any night from July to September locate brilliant Vega high in the sky in the small constellation of Lyra. Well south and slightly east of Vega you'll also see bright Altair in Aquila, these two, with Deneb in Cygnus forming the so-called Summer Triangle. Continue the line from Vega through Altair for about two-thirds their distance again and you'll come to the third magnitude ***Algedi (α Capricorni)***. You won't even need binoculars to spot that this isn't one, but two stars separated by a distance one-fifth the diameter of the Moon. However they're not a related pair as, despite their similar brightness of around mag 4, one is over ten times further from us than the other.

Train your telescope on these two (any 'scope, any power) and they become four as each of them is a true binary. *α* has a mag 9.2 companion, a wide 45 arc seconds away to the SE, the other is accompanied much closer in by a mag 11 star just 7" to the SW. A power around 100x gives a fine view of the quartet in a slightly skewed but neat trapezium shape.

As a bonus while you're in the area, when you've had your fill of the delightful Algedi move 2½° south and slightly east to ***β Capricorni***, (Dabih), a triple star of which only two are seen. These however more than make up for the bashful third for one is bright yellow, the other decidedly blue. As further compensation an unrelated star on the other side of the bright one displays a pleasing bluish-green hue making the whole scene quite charming.

Incidentally, Dabih translates as 'lucky one of the slaughterers' - make of that what you will.

Bert Paice
Originally published in NZ - July 1999

CHRISTMAS OBSERVATORY CLOSURES

This years Christmas and New Year period rather clashes with our normal Thursday meetings so we have decided to close the observatory as follows:

Thurs 20th Dec OPEN

Thurs 27th Dec CLOSED

Thurs 03rd Jan CLOSED

NOISE EFFECTS IN ASTRONOMICAL PROCESSES

Reference Material for November's Monthly Meeting

Types of Noise

- Noise in a camera has a strong influence on the maximum responsivity and the dynamic range of a camera. Reasons for sensor noise are quite different and are explained below:
- **Temporal noise**
  The expression temporal noise summarizes all noise sources that have an influence on the temporary progress of a pixel value, i.e. from image to image. **Temporal noise is made up from photon, dark current, readout and quantisation noise described below.** It tends to be the dominant noise source found in *CCDs* as the charge of each pixel is shifted many times during readout.
- **Photon noise**
  A source for sensor noise is the light itself. The photon flux that strikes the sensor is not even, but poisson-distributed, causing the so called photon noise or shot noise. In addition it limits the maximum signal-to-noise ratio negatively.
- **Dark current noise**
  Dark current noise is created by electrons that emerge through thermal processes in the pixel. The number of electrons increases with increased exposure time and temperature. Dark noise can be reduced by cooling the sensor, which removes inherent energy from the sensor, thus reducing the number of rogue electrons.
- **Readout noise**
  This type of noise occurs when charge (electrons) is converted into voltage (for CCD sensors also when charge is transferred through the shift registers or pixels). **Along with the sensor design, the extent of read out noise is connected to the readout speed.** Typically noise increases with higher clock rates. There is a clear balance between speed and noise which should be considered when selecting the right camera.
- **Quantisation noise**
  A/D-conversion can also be a cause of noise as a voltage (continuous values) is converted into a digital value (discrete values).
- **Spatial noise**
  The term spatial noise describes spatial variations of the intensities of different pixels when illuminated with homogeneous light. The causes of spatial noise include FPN and PRNU noise as described below. Spatial noise tends to be more dominant in *CMOS sensors* as the pixels are read out through different readout circuits.
- *Fixed pattern noise FPN* **(offset noise)**
  FPN is defined as the peak-to-peak difference between the minimum and maximum measured values for all active pixels in the array. As this should be measured with the sensor in darkness, it is also called dark signal non-uniformity (DSNU).
- *Pixel response non-uniformity PRNU* **(gain noise)**
  Pixel response non-uniformity is described as deviations between pixels with a fixed gain applied. **This is caused by the fact that individual pixels have different sensitivity curves.**

Internet: Links

- *Types of noise and S/N examples*
- *ADC explanation of quantisation noise*
- *Sensitivity of eyes*
- *Shot noise*
- *White noise description*
- *Effect of telescope vibrations*
- *Pixel jitter*
- *Types of noise in imaging*
- *Imaging noise*
- *CCD characteristics*
- *Detection capability of eyes*
- *Eyes – Modulation Transfer Function*
- *Eyes - Lateral Inhibition*
- *Quantum efficiency of the eye*
- *CCD vs CMOS imaging*
- *Photon leads to >1 electron QE > 100%*
- *Oversampling - quantising noise*
- *Description of solid state detectors CCD, CMOS, IRFPA*
- *Comprehensive – how film works*
- *Dynamic range of the eye*
- *Practical evaluation of the human eye dynamic range*

Book

Handbook of Astronomical IMAGE PROCESSING
Authors: Richard Berry and James Burnell
Published by: *Willman-Bell, Inc*

(Excellent book, practical, theoretical with superb explanations)

Dudley Johnson

ASTRONOMERS FIND POSSIBLE ELUSIVE STAR BEHIND SUPERNOVA

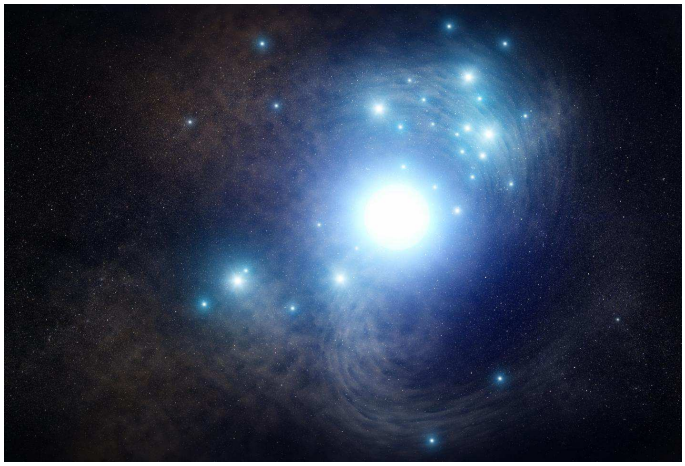


Image: TAn Artist's Concept of a Blue Supergiant Star that once Existed Inside a Cluster of Young Stars in the Spiral Galaxy NGC 3938, Located 65 Million Light-Years away. CREDIT: NASA, ESA, AND J. OLMSTED (STSCI)

Astronomers may have finally uncovered the long-sought progenitor to a specific type of exploding star by sifting through NASA Hubble Space Telescope archival data. The supernova, called a Type Ic, is thought to detonate after its massive star has shed or been stripped of its outer layers of hydrogen and helium.

These stars could be among the most massive known -- at least 30 times heftier than our Sun. Even after shedding some of their material late in life, they are expected to be big and bright. So it was a mystery why astronomers had not been able to nab one of these stars in pre-explosion images.

Finally, in 2017, astronomers got lucky. A nearby star ended its life as a Type Ic supernova. Two teams of astronomers pored through the archive of Hubble images to uncover the putative precursor star in pre-explosion photos taken in 2007. The supernova, catalogued as SN 2017ein, appeared near the center of the nearby spiral galaxy NGC 3938, located roughly 65 million light-years away.

This potential discovery could yield insight into stellar evolution, including how the masses of stars are distributed when they are born in batches.

“Finding a bona fide progenitor of a supernova Ic is a big prize of progenitor searching,” said Schuyler Van Dyk of the California Institute of Technology (Caltech) in Pasadena, lead researcher of one of the teams. “We now have for the first time a clearly detected candidate object.” His team’s paper was published in June in The Astrophysical Journal.

A paper by a second team, which appeared in the Oct. 21, 2018, issue of the Monthly Notices of the Royal Astronomical Society, is consistent with the earlier team’s conclusions.

“We were fortunate that the supernova was nearby and very bright, about 5 to 10 times brighter than other Type Ic supernovas, which may have made the progenitor easier to find,” said Charles Kilpatrick of the University of California, Santa Cruz, leader of the second team. “Astronomers have observed many Type Ic supernovas, but they are all too far away for Hubble to resolve. You need one of these massive, bright stars in a nearby galaxy to go off. It looks like most Type Ic supernovas are less massive and therefore less bright, and that's the reason we haven’t been able to find them.”

An analysis of the object’s colors shows that it is blue and extremely hot. Based on that assessment, both teams suggest two possibilities for the source’s identity. The progenitor could be a single hefty star between 45 and 55 times more massive than our Sun. Another idea is that it could have been a massive binary-star system in which one of the stars weighs between 60 and 80 solar masses and the other roughly 48 suns. In this latter scenario, the stars are orbiting closely and interact with each other. The more massive star is stripped of its hydrogen and helium layers by the close companion, and eventually explodes as a supernova.

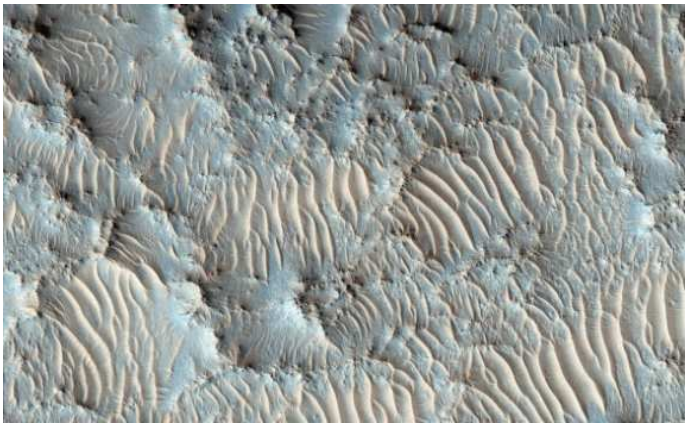
The possibility of a massive double-star system is a surprise. “This is not what we would expect from current models, which call for lower-mass interacting binary progenitor systems,” Van Dyk said.

Expectations on the identity of the progenitors of Type Ic supernovas have been a puzzle. Astronomers have known that the supernovas were deficient in hydrogen and helium, and initially proposed that some hefty stars shed this material in a strong wind (a stream of charged particles) before they exploded. When they didn't find the progenitors stars, which should have been extremely massive and bright, they suggested a second method to produce the exploding stars that involves a pair of close-orbiting, lower-mass binary stars. In this scenario, the heftier star is stripped of its hydrogen and helium by its companion. But the “stripped” star is still massive enough to eventually explode as a Type Ic supernova.

More at: https://www.eurekalert.org/

WHY NASA THINKS THIS CRATER IS THE BEST SPOT TO SEARCH FOR LIFE ON MARS

After more than four years of debate, an ancient crater lake emerged as the top landing spot for the Mars2020 rover.



When NASA sends its next rover to Mars in 2020, it'll be aimed at a small patch of alien landscape near Jezero Crater. The landing site, announced today and selected by NASA associate administrator for the Science Mission Directorate Thomas Zurbuchen, hosts a fossilized river delta that formed as water trickled into an ancient crater lake.

The site "offers geologically rich terrain with landforms reaching as far back as 3.6 billion years, and could potentially answer important questions in planetary evolution and astrobiology," Zurbuchen said during a press conference.

"Getting samples from this unique area will revolutionize how we think about Mars and its ability to harbor life." (Read more about whether water on Mars might be able to host life as we know it.)

Unlike most Mars rovers and landers of prior decades, the 2020 robot's mission will be to not only find hints of warm, watery conditions in the past, but to also set up the search for life itself. It will do this by collecting and caching samples of Mars rocks for a future spacecraft to retrieve and return to Earth, and it will sniff around for the distinctive signatures of biology in the rocks it encounters.

"We want to seek evidence of possible ancient life on Mars and second, we want to seek a diversity of rock types with which to explore the history and evolution of Mars," says Ken Farley, the Mars2020 project scientist.

Building on the past

Today's announcement comes during the tense final days before NASA attempts to set a different spacecraft on the red planet. Called InSight, that mission will use a stationary lander to reconstruct an image of the Martian interior using seismic waves, which should help scientists understand the planet's formation and early history.

Though Mars is a parched, toxic desert today, the planet was once much warmer and covered in liquid seas. For almost a billion years, while its core churned and produced a protective magnetic field, Mars may have been among the friendlier places for life as we know it to set up and flourish.

The trouble is, finding evidence for past life on an alien world, especially if that extinct life is microscopic, is not exactly easy—but that is what the $2.4-billion 2020 rover will attempt to do.

Similar in design to the Curiosity rover, which set down in Gale Crater in 2012, Mars2020 will be a six-wheeled, nuclear-powered vehicle capable of traversing myriad terrains. Like Curiosity, the rover will need to survive a rollercoaster of a landing, which will once again involve a device called a sky crane, but the landing should be a bit easier because of technology updates. If all goes according to plan, the rover will land in Jezero on February 18, 2021.

Scientists work on the Mars2020 rover inside the Spacecraft Assembly Facility at NASA's Jet Propulsion Laboratory in California.

There's a whole lot more info including videos, links and more photos at:
https://www.nationalgeographic.com/

THE BACK PAGE

LINKS, COMMENTS AND OBSERVATIONS

A Few Links for You

- A really stunning site for anyone interested in aeriel viws of Earth: *https://www.dailyoverview.com/eightyone*
- I recently discovered Photopea a free web-based image editor that closely mimics the look and feel of Photoshop. It even imports and exports .PSD files. Here's a good introductory video: *https://www.photopea.com/*
- Farewell, Kepler: NASA Shuts Down Prolific Planet-Hunting Space Telescope: *https://www.space.com/42461-kepler-exoplanet-hunting-telescope-shuts-down.html*
- The International Space Station has been in orbit for 20 years: *https://boingboing.net/2018/11/22/the-international-space-statio-2.html*
- Overflowing crater lakes carved canyons across Mars: *https://www.sciencedaily.com/releases/2018/11/181116164505.htm*

Don't forget there is no New Zenith next month. We start again with the February edition.

Have a great Christmas and see you all again in 2019

Easyfundraising

Not long to go until Christmas!

Remember to use easyfundraising when you're buying your Christmas gifts online. VAS want to raise as much as possible this year and it couldn't be easier through easyfundraising!

Just use this link:

https://www.easyfundraising.org.uk/causes/vectisastronomicalsociety/

Every time you buy something from one of the many retailers involved, a percentage of what you spend is donated to VAS, and the best bit is,
it costs you nothing!

Observatory

For your own safety, please bring a torch. Also, please make sure you close and lock the car park gate if you are the last to leave - if you need the combination to the lock, please contact a member of the committee.

Articles Needed

NZ needs letters, articles, reviews or pictures related to astronomy.
Contact details on page 1.

"If there is magic on this planet, it is contained in water"
Loren Eiseley

"I believe alien life is quite common in the universe, although intelligent life is less so. Some say it has yet to appear on planet Earth"
Stephen Hawking

"No other planet in the solar system is a suitable home for human beings; it's this world or nothing. That's a very powerful perception"
Carl Sagan

"After one look at this planet any visitor from space would say 'I want to see the manager'"
William S Burroughs