New Zenith

The Monthly Magazine of the Vectis Astronomical Society

Vol 21 Issue 7 — August 2013

When Printed, this Newsletter costs VAS at least £1

Society News

Observatory Telescope

The Meade LX200 is now back in the observatory but has yet to be fully re-aligned. This will be completed in the very near future (when Barry gets back from France!) and normal service will soon be resumed. Thanks for your patience....

The solarscope is still available for those interested.

Internet Access

At a recent Committee meeting it was decided that we should get connected. I am pleased to announce that this will be done on Monday 29th July and we will then have full internet access. This service is being provided by click4internet.com and makes use of the high speed wireless service they offer across almost all of the Island.

Wireless connection for your own equipment will also be available, please contact me for login details.

Watery Lane Site

It's good to see the grass has been cut and the pavilion guttering repaired. The whole site looks much better - all we need now is a few dark nights!

Themed Thursdays

Could any member, who can provide a short talk on any astronomy related subject, please contact me with a view to starting a series of "Themed Thursdays".

I am hoping to start monthly short talk evenings as soon as possible. Talks should last a maximum of about 30 minutes and I am particularly interested to hear from anyone with experience in:

- Webcam photography
- CCD/SLR photography
- Image processing
- etc etc....

Clear Skies!
Brian Curd
Observatory Director

VAS Website: www.wightastronomy.org

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

The Editor New Zenith
35 Forest Road
Winford
Sandown PO36 0JY

Tel: **01983 864303** or email: **editor@wightastronomy.org**

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

VAS Registered Office

35 Forest Road, Winford, Isle of Wight, PO36 0JY

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Observatory Diary

Monday, 19.30hrs	Members Only by arrangement Telescope and night sky training. Contact Barry Bates 01983 872979
Thursday, 19.30hrs	Members and Public. Informal meeting and observing.

Contents this Month

Monthly Meeting Calendar 2013

Do You Know a Speaker?

If you know speaker, or perhaps you would be prepared to have a go, please contact Elaine Spear at ***progorg@wightastronomy.org***

Check the website for up to the minute information.

Travel for our monthly speakers is sponsored by:

WIGHTLINK
PART OF ISLAND LIFE

Date	Subject	Speaker
26 Jul	Practical Radio Astronomy for Amateurs	Paul Hyde
23 Aug	Particle Physics, ATLAS and the LHC **AGM - Start at 19.00hrs**	Dr Christopher Lester
27 Sep	Atmospheric electricity and high energy particles	Prof Giles Harrison
25 Oct	Radio Astronomy	Dr Sadie Jones
22 Nov		

All details correct at time of publication.

Garlic Festival

The Garlic Festival this year is to be held on the weekend of 17th-18th August 2012.

I'm sure most VAS members realise this is our single most important fund raising opportunity of the year.

As well as providing marshals for the event. VAS will also have a Society information tent.

Assuming you are reasonably fit, don't mind being on your feet for most of the day and can help during the weekend, please contact

Richard Flux - *richard.flux@iow.nhs.uk*

VAS Contacts 2013	
Chairman	Bryn Davis chairman@wightastronomy.org
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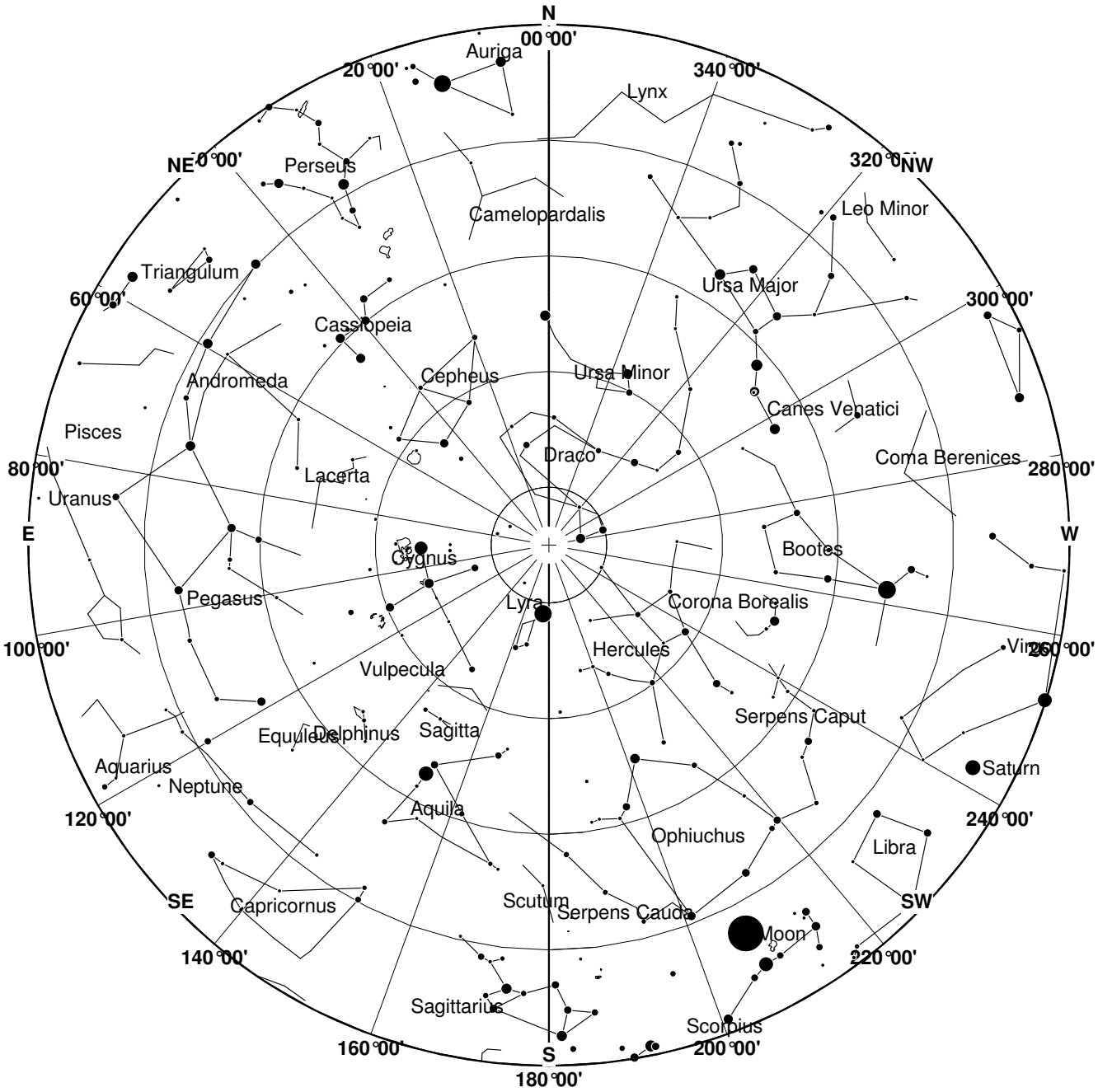
NZ Distribution	Brian Bond distribution@wightastronomy.org
Others	Barry Bates Mark Williams

We're getting very close to August and our AGM!

Be part of the future of VAS, please consider joining the Committee.

2013/14 promises to be a turning point!

August 2013 Sky Map



View from Newchurch Isle of Wight UK - 2200hrs - 15 August 2013

Messier 29 (also known as M 29 or NGC 6913) is an open cluster in the Cygnus constellation. Discovered by Charles Messier in 1764, and can be seen using binoculars.
M29 is situated in the highly crowded area of Milky Way near Gamma Cygni.
According to the Sky Catalog 2000, M29 is included in the Cygnus OB1 association, and approaching us at 28 km/s. Its age is estimated at 10 million years, as its five hottest stars are all giants of spectral class B0. The Night Sky Observer's Guide gives the apparent brightness of the brightest star as 8.59 visual magnitudes. The absolute magnitude may be an impressive -8.2 mag, or a luminosity of 160,000 suns. The linear diameter was estimated at only 11 light years.

August 2013 Night Sky

Moon Phases

New	1st Qtr	Full	Last Qtr
6th	14th	21st	28th

Planets

Mercury

The first half of the month provides a brief apparition of Mercury low down in the pre-dawn sky. This is one for early risers with a good eastern horizon.

The table shows the altitude and azimuth of mercury at 05:00. Following a line from the much brighter Jupiter down towards the point where the Sun will rise may help find this elusive world.

Date	Alt	Az
1 Aug	8.25	67
4 Aug	8	66
8 Aug	6	65
12 Aug	6.25	63

Venus

Venus is visible low down in the west after sunset. The planets and the moon more difficult to observe in the evening at this time of year because as autumn approaches the ecliptic in evening sky moves closer to the horizon. This will cause the remainder of this apparition of Venus to be unremarkable with the evening star reluctant to move away from the horizon.

Mars

Mars remains a challenge being rather faint against the brightening pre-dawn sky. In the first week of the month it lies between the much brighter Jupiter and Mercury.

Jupiter

Acting as signpost for the morning planets Jupiter can be found amongst the stars of Gemini and outshining all of them. On the 3rd, 4th and 5th the moon glides past the three morning planets making for a potential photo opportunity

Saturn

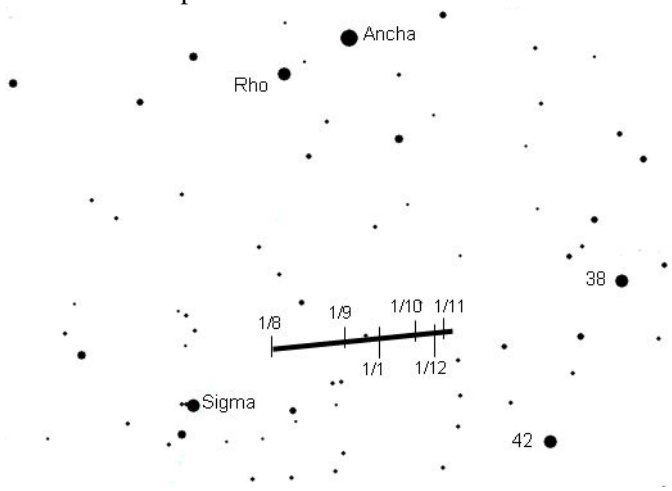
Saturn is in the southwest at sunset, but is so low down it must now be considered an unfavourable object

Uranus

Uranus is an early morning object close to Delta Piscium. In binoculars a straggly string of four roughly equal brightness stars dropping down from Delta can be seen. The apparent distance between each star increases as they move away from Delta. The 4th "*star*" is the planet Uranus.

Neptune

Located amongst the dim stars of Aquarius, Neptune is quite a challenge to locate as there are no bright guide stars nearby. The finder chart shows its path until the end of the year. Stars to magnitude 9 are shown; a full magnitude fainter than Neptune.



Path of Neptune through Aquarius from August to the end of December

Meteor Showers

August is the time for meteors with the peak of the regular Perseids meteor shower on the 12th. Look a day or so either side of the peak, the shower lasts at low levels for several weeks so activity can be good at any time.

Deep Sky

M27 Dumbbell Nebula RA 19h 59m Dec 22° 44' mag 7.5

The summer sky's show piece planetary nebula can easily be seen as a rectangular patch of light bluish grey nebulosity with 10x50 binoculars. It is quite a large object; almost half the diameter of the full moon. A small telescope will show some detail, and some users of large telescopes even claim to be able to see traces of colour. The nebula consists of multiple gas shells moving away from the central star some moving at speeds of 30km/s.

M29 Open Cluster RA 20h 24m Dec 38° 32' mag 6.6

Located in the Cygnus arm of the Milky Way this cluster is somewhat over shadowed by the surrounding star fields. It is also dimmed by the dust along our line of sight. Despite all this it is a worthwhile cluster to observe; its brightest members form two opposing arcs that give the impression of a miniature version of the Pleiades.

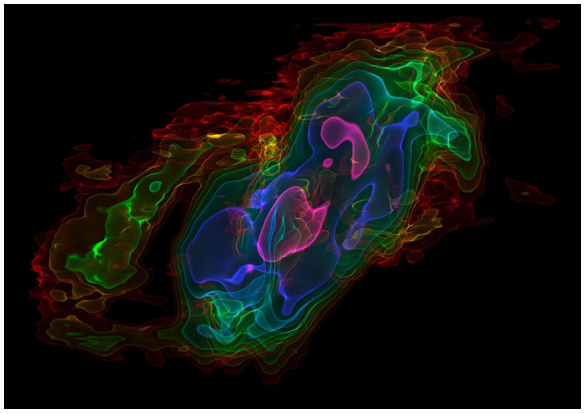
M11 Wild Duck Cluster RA 18h 51m Dec -6° 16' mag 7.0

Easily seen in binoculars as a fuzzy patch in the Scutum Star clouds, this cluster gets its name from the V shape formed by two long chains of stars on its northern edge. They are supposed to represent the V formation of a flock of wild ducks flying across the Milky Way.

Peter Burgess

The Dark Skies Initiative now has its own website
darkwightskies.com

ALMA sheds light on mystery of missing massive galaxies



3-D view of ALMA observations of the outflows from NGC 253. // ESO

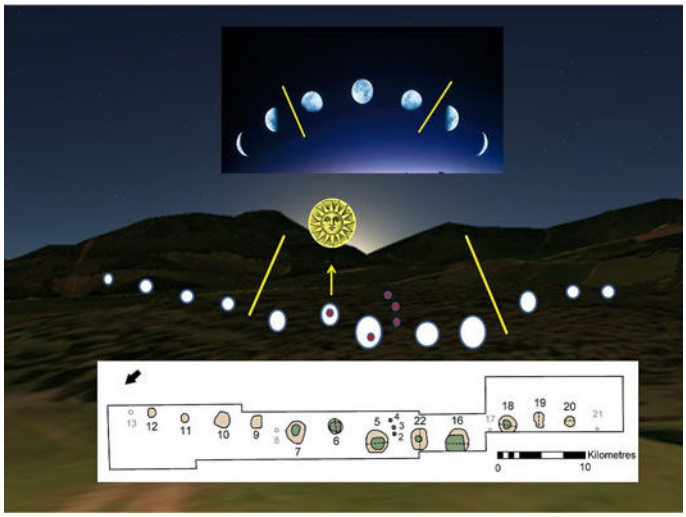
New images show enormous outflows of molecular gas ejected by star-forming regions in the Sculptor Galaxy.
By ESO, Garching, Germany — Published: July 24, 2013

New observations from the Atacama Large Millimeter/ submillimeter Array (ALMA) in Chile have given astronomers the best view yet of how vigorous star formation can blast gas out of a galaxy and starve future generations of stars of the fuel they need to form and grow. The dramatic images show enormous outflows of molecular gas ejected by star-forming regions in the nearby Sculptor Galaxy. These new results help to explain the strange paucity of massive galaxies in the universe.

Galaxies — systems like our Milky Way that contain up to hundreds of billions of stars — are the basic building blocks of the cosmos. One ambitious goal of contemporary astronomy is to understand the ways in which galaxies grow and evolve, a key question being star formation: What determines the number of new stars that will form in a galaxy?

More at: ***http://goo.gl/kktdWk***

World's oldest calendar found in a Scottish field



The world's oldest calendar has been found in a field in Scotland, and could date back to 8,000 BC.

Researchers at the University of St Andrews were part of the team which analysed the Mesolithic monument originally excavated in Aberdeenshire by the National Trust for Scotland in 2004.

Their research is now published in the journal Internet Archaeology and sheds new light on the luni-solar device.

The team, led by Birmingham University, believes the "calendar" was created by hunter-gatherer societies and pre-dates the first formal time-measuring devices known to humanity, found in the Near East, by nearly 5,000 years.

The capacity to measure time is among the most important of human achievements and the issue of when time was 'created' by humankind is critical in understanding how society has developed.

Until now the first formal calendars appear to have been created in Mesopotamia around 5000 years ago. But during this project the researchers discovered that a monument created in Aberdeenshire nearly 10,000 years ago appears to mimic the phases of the Moon in order to track lunar months over the course of a year.

The site, at Warren Field, Crathes, also aligns on the Midwinter Sunrise, providing an annual astronomic correction in order to maintain the link between the passage of time, indicated by the moon, the asynchronous solar year and the associated seasons.

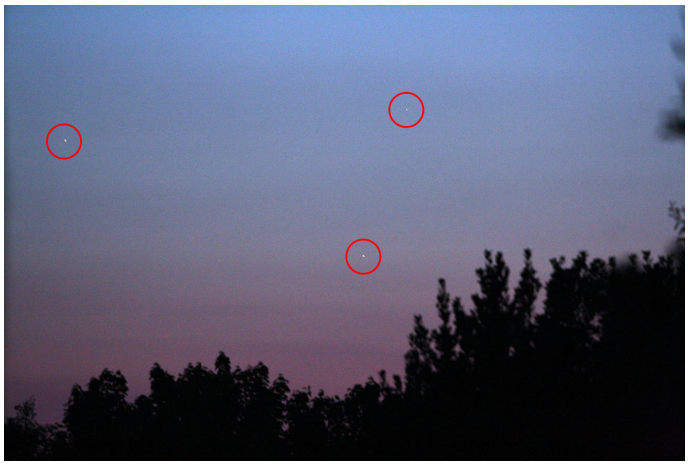
Read more at: ***http://www.st-andrews.ac.uk/news/***

Three Planets at Sunset

"Look out for a fine conjunction of three planets low in the north-northwestern sky just after sunset at the end of this month, especially as one of them is Mercury making it very easy to identify by being in the close company of much brighter Jupiter and the unmistakable Venus."

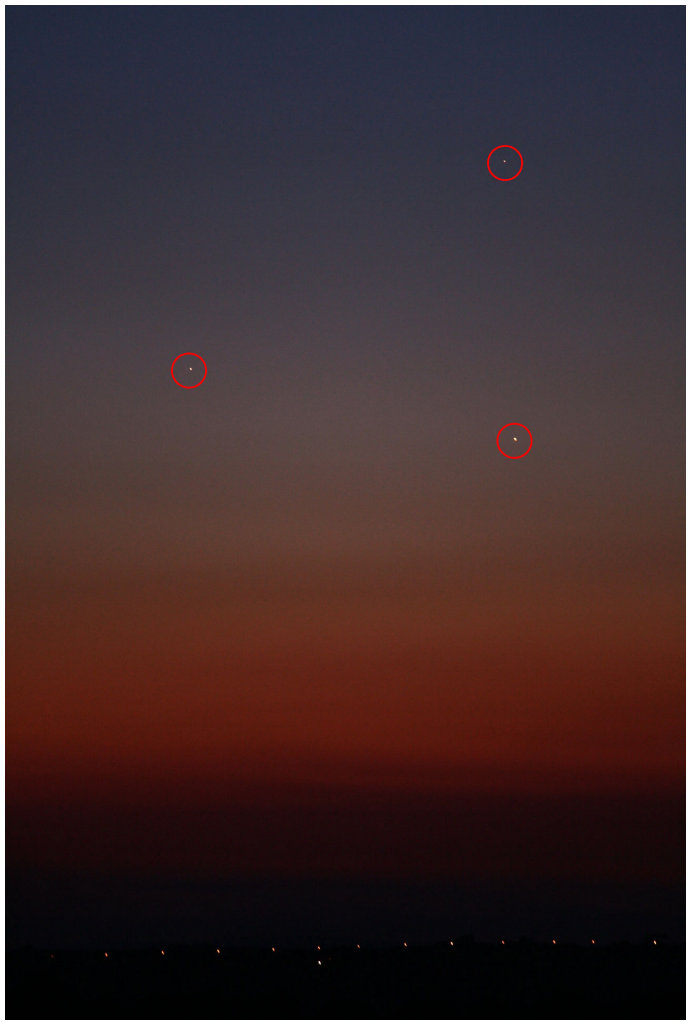
This was the first item of Peter's review of what to look for this month at the VAS meeting on May 24th 2013. Next days as luck would have it the sky cleared just before sunset so I decided to do a trial run and because the western horizon from our Newport garden is quite cluttered and higher ground obscures everything below ten degrees anyway that meant viewing from an upstairs window.

Venus was easy to find but already sinking quickly towards the trees and through binoculars it didn't take long to find both Jupiter and Mercury. Of the dozen or more pictures I took leaning out of the window only one of them was good enough to keep but it was my first picture of Mercury. [see below]



With similar weather the next day a trip to see the old motors at Havenstreet took us past a much better site from which to observe. Room to park, clear NW horizon and best of all, room on the verge for a tripod. We were back just after sunset, camera set up, me looking for Venus, Angela doing Sudoku in the car. It was a long wait, punctuated briefly by the passing interest of a couple of the boys in blue but isn't it odd when you finally find something in a darkening sky, you wonder how you could have missed it when you looked at the same place only moments before. By now the sky had darkened and a deep red-orange layer began to form just above the rather murky horizon [see the second picture]. The street lights at the bottom of the image are probably those along Fairlee Road out of Newport towards the Racecourse.

In both pictures Venus is the bright object lower right with Jupiter to its left and much fainter Mercury above right. According to Starry Night all three planets stay between 3º and 5.5º above the horizon in these two images.



With thanks to Peter Burgess for his timely reminder to go out and look for these things.

Brian Bond

For the technical minded:

- Picture 1: Shutter speed 1/30s; f/5; ISO 1600; focal length 200mm.
- Picture 2: Shutter speed 1/25s; f/4; ISO 400; focal length 200mm
- Camera: Canon 1000D.

Editors Note:

I have added the red circles to Brian's pictures as I am not sure how well the planets will resolve in the printed version of NZ. The original pictures are available here:

- ***http://www.wightastronomy.org/picture1.jpg***
- ***http://www.wightastronomy.org/picture2.jpg***

Little Green Things - Detecting Life on Earth and Exoplanets

Lecture report 28 June 2013

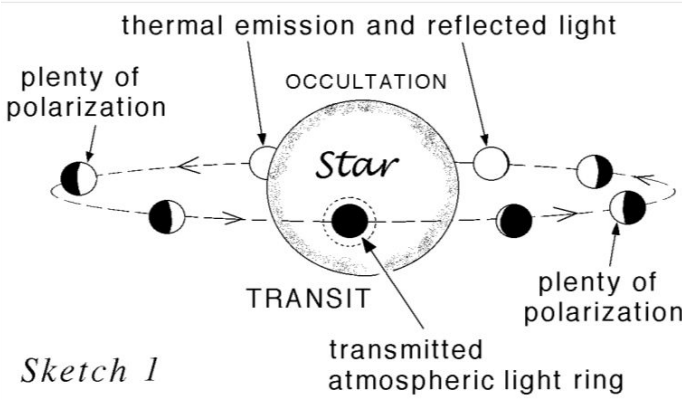
Professor William E Martin - *Centre for Atmospheric & Instrumentation Research, CAIR Science and Technology Research Institute, STRI University of Hertfordshire*

The Chairman, Professor Bryn Davis, introduced the speaker, a physicist and amateur astronomer, who works with a team of astrophysicists. The speaker said it would be "a short talk"- however it well occupied the lecture time, accommodating much interest and discussion. The subject was illustrated with plenty of graphs and diagrams - just a few are sketched in this report.

The talk began with a Hubble Space Telescope deep field image, with galaxies in the foreground and specks in the background, each speck is not a star but a very distant galaxy. This is what the universe looks like, but in this talk we are dealing with nearby stars in our own Milky Way and the possibility that some may have rocky exoplanets containing simple lifeforms - single cell and multicellular organisms, bacteria, microbes, algae, mosses, lichens and perhaps leafy material. Could their light-harvesting properties give rise to detectable 'biosignatures' in the light reflected from the surfaces of exoplanets?

Our own Earth provides much data concerning what might be happening on exoplanets. Various aspects are being researched at Hatfield where spectropolarimeters have been developed and then used on large aperture telescopes - this is fundamental research providing clues as to why organisms on a planet evolve with a particular chirality - more later. The light properties of primitive organisms, such as chroococcidiopsis, arabidopsis thaliana, and others (coded as P1, M41 and M21) are being investigated. Exoplanets orbiting hotter or cooler sun-like stars may harbour organisms different from terrestrial life.

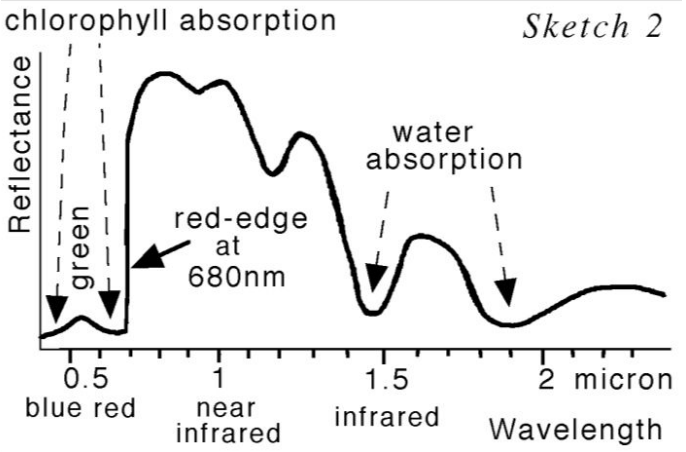
Looking for Life. The co-existence of certain combinations of gases on exoplanets, which cannot be explained without biological activity, would be strong evidence for the existence of organisms. One basic combination, familiar to us, is water vapour, carbon dioxide, and oxygen in the presence of methane and nitrous oxide. Venus, Earth and Mars all exhibit dips in their absorption spectra corresponding to carbon dioxide. Life on Earth has generated an extra dip for ozone - ozone indicates the presence of oxygen and is easier to detect, and water shows up too. Methane on its own is not a good indicator since it can be produced by volcanoes. Research is proceeding on analyzing exoplanetary atmospheres during transits across their parent stars, *Sketch 1*.



Sketch 1

Polarization: Light reflecting from exoplanets will be partly polarized, giving data on surface composition, *Sketch 1*. But it isn't that easy to acquire observational data on how the Earth would look from afar when transiting the Sun, or when reflecting its light from a position where a distant observer would see a crescent or other phase of the Earth, with light passing through different thicknesses of atmosphere, haze and cloud particulates - all this light would be present in an unresolved image. But good data useful for comparison purposes has been obtained by studying Earthshine - more later.

Chlorophyll and the 'red edge'. The transmission spectrum of our atmosphere was illustrated. When sunlight reaches green leaves, the light enters the cells and clever things happen. Chlorophyll and pigments pick out light of particular wavelengths needed to make sugars, and oxygen is made as a metabolic byproduct too. The light from the leaves in the visible spectrum ends up dominantly green. To prevent damage, the leaves must stay cool, so the infrared is scattered out of the foliage, the gaps between the leaf cells give optics like a chandelier, so infrared is transmitted, reflected, and scattered but not absorbed. This occurs for light with wavelengths longer than the 'red-edge', slightly beyond the visible spectrum, see *Sketch 2*.



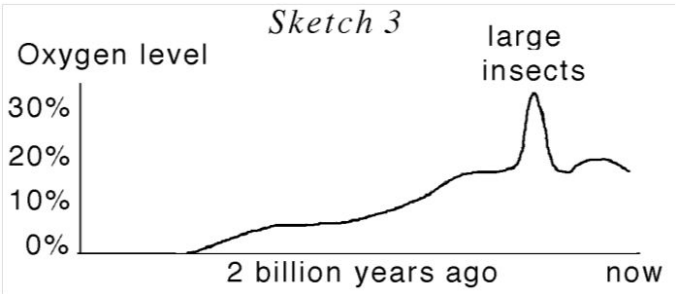
Sketch 2

The precise red-edge wavelength depends on the plant type. The red-edge is used to survey the health of crops (and is simulated by military camouflage netting.)

Views of Earth from EPOXI: this NASA spacecraft acquired its new name after sending an impactor into Comet 9P Tempel, and is now on an extended mission. In infrared, green leaves show up very bright and a massive area of infrared can be seen across Asia reflecting from the vegetation. A movie showed its diurnal variation. It would be seasonal too and variations like this would help to identify such light from an exoplanet.

Earthshine: Being too far away to resolve the details of an exoplanet, then the total integrated light will need to be analyzed. But given all the other light reflected from a planet, then would the red-edge effect still show? Insights have been obtained from Earthshine - the brightly lit Earth reflects light in many directions including towards the Moon, becoming reflected off its dark side. This light varies as expected in intensity and wavelength, depending on Sun, Earth and Moon directions, cloud cover and whether oceans or land dominate Earth's reflected light at that time. The red-edge is detectable at about the 4% to 10% level in this doubly reflected light.

Wide time windows for simple life: The Earth has not always looked like it does now. There was the Great Oxygenation Event (GOE) of 2.5 billion years ago when blue-green algae and cyanobacteria managed to produce an excess of oxygen, exceeding its absorption by rusting rocks. Evolution, as we know it, then began when an ozone layer formed, allowing plants and organisms to emerge from the water which had protected them from the Sun's ultraviolet radiation. Atmospheric oxygen peaked, see *Sketch 3*, tallying with large insects coming into being. The various geologic periods, Paleozoic, Mesozoic, Cenozoic, hominid, including periods of dinosaurs, fossil formation, and the Cambrian explosion were illustrated. The time window for complex life, including hominids, is only tens of millions of years. However, the window for simpler organisms has already been open for billions of years, and will remain open for billions of years to come, until the host star expands into a red dwarf and all life forms, thermophiles and so on, succumb to increasing temperature and a hostile sulphuric acid atmosphere.



A rocky exoplanet in the habitable zone is thus far more likely to be found harbouring simple organisms - mosses, lichens coating rocks, et cetera, than higher forms of life. It is tempting to do the following arithmetic:- divide the tens of millions of years for the 'narrow window' allowing intelligent life, into the billions of years for simple organisms, and the ratio of exoplanets where Little Green Men live to the number of exoplanets where only Little Green Things can be found, appears to be about one in a thousand.

The life history of various stars able to provide suitable habitats for exoplanetary life was discussed, including M-stars and stellar flares, as well as atmospheric modelling of the Earth's early and later atmospheres. Anaerobic organisms were largely wiped out by the GOE (see Wikipedia) so we need to know how biosignatures change with time over billions of years in a planet's life.

Other star types: Chlorophyll can function with different light types but for hotter parent stars, complex life on exoplanets would live for shorter times, and plants would need to reflect more light. Photosynthesis may develop identical to ours, but planets orbiting stars cooler than the Sun may use lower energy photons in threes and fours to split water molecules, giving red-edges at longer wavelengths. Here, plants use photons in twos.

Chirality: Refers to molecules having a 'handedness' like a screw-thread. All our DNA molecules are right-handed. Amino-acids and sugars are 'optically active' too, so they rotate the plane of polarization of transmitted light (see 'Circular Dichroism' in Wikipedia). When reflected from biological materials, light acquires a circular polarization of one particular hand and not the other. This is referred to as 'homochirality' and could thus imprint a biosignature into the light reflected from an exoplanet. The handedness of homochirality may have its origins in an abundance of circularly polarized light preferentially of one hand in star-forming regions. A bias in the chirality could be very significant as a biosignature. The chemicals found in meteorites show such a bias. Some minerals show such effects too, but these can be calibrated out from biosignatures.

The future: Primitive forms of life could be abundant on rocky exoplanets in habitable zones and may have detectable biosignatures, showing diurnal and seasonal variability. With developments in instrumentation and the space-based James Webb telescope coming into service, obtaining evidence for biomarker gases and exoplanetary biosignatures in the next twenty years is realistic. More data is to be found in the references.

Discussion included protective plant compounds which might widen the time windows for life on exoplanets. Green vegetation gives strong signals in the infrared, but no strong biosignal from Titan is expected since there is no oxygen and no chlorophyll there. But biosignatures would vary according to the type of life cycle (see Kiang's article). Super Earths several times more massive than our Earth may have life-supporting atmospheres. The observeable atmospheric chemistry of an exoplanet, tidally locked to its parent star, may depend

upon its phase. The whole fascinating subject combines astrophysics with planetary sciences, chemistry and microbiology.

An unstated but implicit message of this lecture appears to be that scientists are now making the assumption that life gets going, given the right conditions and enough time. This is very different from when it was said (possibly by the late Sir Fred Hoyle) that life has about the same chance of forming as a wind blowing through a scrap-yard has of assembling a Jumbo jet.

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Dr.Guy Moore

Ten Strange Facts

- Scientists believe that we can only see about 5% of the matter in the Universe. The rest is made up of invisible matter (called Dark Matter) and a mysterious form of energy known as Dark Energy.
- Neutron stars are so dense, that a soup can full of neutron star material would have more mass than the Moon.
- The Sun produces so much energy, that every second the core releases the equivalent of 100 billion nuclear bombs.
- Galileo Galilei is often incorrectly credited with the invention of the telescope. Instead, historians now believe the Dutch eyeglass maker Johannes Lippershey as its creator. Galileo was, however, probably the first to use the device to study the heavens.
- Black Holes are so dense, and produce such intense gravity, that even light can not escape. Theoretical physicists predict that there are situations under which light can escape (which is called Hawking radiation).
- Light from distant stars and galaxies takes so long to reach us, that we are actually seeing objects as they appeared hundreds, thousands or even millions of years ago. So, as we look up at the sky, we are really looking back in time.
- The Crab Nebula was produced by a supernova explosion in 1054 A.D. The Chinese and Arab astronomers at the time noted that the explosion was so bright, that it was visible during the day, and lit up the night sky for months.
- Shooting stars are usually just tiny dust particles falling through our atmosphere. Comets sometimes pass through Earth's orbit, leaving trails of dust behind. Then as Earth plows through the dust in its path, the particles heat up, creating the streaks in the night sky.
- Even though Mercury is the closest planet to the Sun, temperatures can reach -280 degrees F. Why? Since Mercury has almost no atmosphere, there is nothing to trap heat near the surface. So, the dark side of Mercury (the side facing away from the Sun) is very cold.
- Venus is considerably hotter than Mercury, even though it is further away from the Sun. The thickness of Venus' atmosphere traps heat near the surface of the planet.

THE BACK PAGE

LINKS, COMMENTS AND OBSERVATIONS

Outdoor Lighting

It's a common problem and nice to see it raised on an internet discussion forum:

"My neighbor recently complained about my outdoor floodlight shining in her window. While trying to address this problem, I read an essay about the tragedy of light pollution, and started to think that this is a much broader issue. With all the new lighting technologies out there, this may be the right time to rethink lighting — both indoor and outdoor; public and private. I solved my problem by replacing the floodlight with a spotlight, but I also considered installing a colored light. What are some strategies for illuminating what we need to without casting excess light everywhere and inadvertently blinding our neighbors or keeping them awake?"

The post caused a lot of discussion which can be read at:

http://classic.slashdot.org/story/13/07/23/1318228

Probably the best/funniest response is this one:

http://www.27bslash6.com/halogen.html

Curiosity Sets Record Pace for Longest Drive Yet on Mars

by Ken Kremer on July 24, 2013

NASA's car-sized Curiosity rover is now blazing across the Red Planet's surface and moving at a record setting pace towards a towering Martian mountain loaded with mineral caches that could potentially support a habitable environment.

On Sunday, July 21 (or Sol 340), Curiosity drove the length of a football field – 109.7 yards (100.3 meters) – a span that's twice as far as she had ever driven before since the dramatic touch down on Mars nearly a year ago.

The previous record for a one-day drive was about half a football field – 54 yards (49 meters) – and achieved on Sol 50 (Sept. 26, 2012), roughly seven weeks after the pulse pounding landing inside Gale Crater on Aug. 6, 2012.

The 6 wheeled robot was able to move so far because on the prior drive she wound up atop a rise offering an uncommonly good view of the surrounding landscape and the road ahead across the crater floor towards Mount Sharp – the ultimate driving goal.

Read more: ***http://www.universetoday.com/103667/curiosity-sets-record-pace-for-longest-drive-yet-on-mars/#ixzz2a0fUc994***

August 2013 AGM

Attached to this NZ is a nomination form for the 2013/14 VAS Committee.
Feel free to fill it in as we need your help and input.
You can even nominate yourself if you like!

Observatory

For your own safety, when visiting the VAS observatory, 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

New Zenith needs letters, articles or pictures related to all aspects of astronomy. Contributions to the Editor please at the email or postal address on the front page.

"The lifetime of a human being is measured by decades, the lifetime of the Sun is a hundred million times longer. Compared to a star, we are like mayflies, fleeting ephemeral creatures who live out their lives in the course of a single day."

Carl Sagan

"It's amazing to me that we humans have the intellectual capacity to ask deep questions and to devise methods for learning how the universe works and how its contents evolve with time."

Alex Filippenko

"... the blast signatures of a detonated supernova and that of a nuclear bomb are identical."

Eric Chaisson

VAS Officers and Committee Nominations 2013/14

For those wishing to stand for election at the AGM of the Society to be held on Friday 23rd August 2012 at 7.00pm.

Name and Address of Nominee:

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Standing for

- Chairman ..... ❑
- Treasurer ..... ❑
- Secretary ..... ❑
- Observatory Director ..... ❑
- Membership Secretary ..... ❑
- Program Organiser ..... ❑
- Committee ..... ❑

Proposed by: .....

Seconded by: .....

Signature of Nominee: .....

Notes

1. No person can be elected to more than one position.
2. Only adult fully paid-up members may stand for election (or propose or second).
3. All completed nomination forms to be received by the Secretary in writing at least 7 days before the AGM.
4. The Committee consists of not less than six members.