

TAURANGA ASTRONOMICAL SOCIETY (INC)

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The Matariki Constellation, commonly known to many as the Pleiades, marking the start of the Maori New Year.

May Meeting:

President's Report: May 27 2009

I have much pleasure in presenting this report, which covers just a snapshot of what your society has been working towards, within the last 12 months.

It has been a most rewarding year, yet at sometimes quite frustrating, as we awaited news of the arrival of the telescope, and the start to the construction of our long promised observatory in this building. After a few anxious moments, due to manufacturing delays, our 14-inch Meade LX200ACF telescope finally arrived at the end of March.

It is a most beautiful piece of engineering and is equipped with the very latest sets of computerised star charts, is self tracking and extremely powerful! The telescope is going to be a terrific asset, and I hope it will bring great pleasure to all who use it. In addition we have purchased a number of extra eyepieces, as well as a digital camera, so that we can record and display any object to a wider audience, than just the sole observer or operator.

Special thanks must go to my enthusiastic and hard working committee, especially to Andrew Walker, who not only produced our Society Newsletter but was also our technical adviser, and arranged the purchase and delivery of additional equipment for the telescope. Due to a whole host of commitments, Andrew is stepping down from the committee, but we hope that at some time in the future you will be able to return.

Thanks also to Secretary Jim Barrowclough, who has kept us well informed on all matters of international and local importance. Jim has maintained an extensive mailing list, forwarding up to the minute news to members and interested people from web sites including NASA, Spaceweather.Com, and more recently One Minute Astronomers. Our finances are in top shape, and our membership continues to grow. We participated in the 100 hours of IYA - the International Year of Astronomy with a number of our committee setting up telescopes on the streets, in parks and in Schools. There was some excellent feedback from amongst about 160 members of the public.

In July we organised a bus trip to Auckland Stardome for members to experience their new 2.5 million dollar 3D planetarium, which CEO Craig Garner (formerly of Tauranga) helped purchase. Back home, in August we hosted Senior lecturer Tim Natusch from the Auckland University of Technology, who brought us up to date with his work in the field of Radio Astronomy and New Zealand's role in the proposed Square Kilometre Array in Australia.

In March we broke all attendance records in this hall with a standing room only audience to hear our Patron, Dr Grant Christie deliver a wonderful presentation on how the planets formed. Those visits by Grant Christie and Tim Natusch were made possible with the help of funding from the Gifford Eiby Memorial Lectureship Fund, which is administered by the Royal Astronomical Society and is available for affiliated societies such as ours... Special thanks also for the funding that we receive from the Tauranga Moana Committee of COGS: the Community Organisation Grants Scheme. Without their generous grants we would be unable to carry out our aims and objectives of bringing the science of astronomy to the wider public of Tauranga and to the many school and pre-school children living in the Western Bay of Plenty.

I mentioned earlier that it had been a frustrating year, not knowing when we would see our telescope, and more importantly, the observatory, which is to house it. Efforts to have this building extended and given a major facelift started over two years ago. A steering committee was formed from the joint users of the Otumoetai Sport & Recreation Club, which include Otumoetai soccer, Albion Cricket club, Matua Scouts and Guides along with 3 members from Astronomy. An architect and a structural engineer were also on board.

A few weeks ago we were told that the Tauranga City Council had finally granted the Resource and Building Consents, after taking what we all felt was an unacceptably long time to OK the plans. Funding for the half million-dollar extension has been in place for over a year. Sponsors and trades have guaranteed their time and material...with much of the work to be given free by the many parents involved in local and club soccer at

Fergusson Park. Our contribution is a very modest \$10 per head: I know many of you have already made a donation, some indeed rather generous for which the trust is most grateful. We have been told it could take 6 months to complete the additions, so we might be in by November.

Opening day will be very special, I can assure you.



George W Stewart
(President)

An investigation of the Universe:

Ted Harper gave a talk entitled "An investigation of the Universe" in which he provided his insights into what the universe is. This included the universe's shape, what it is in, what black holes and dark matter are. The talk was based on a mathematical model created from the I Ching, an ancient Chinese mathematical system, the binary system, base 8, the Fibonacci sequence and the Golden Mean.

Also he introduced us to some of the important people who were involved in discovering and expanding our understanding of this fascinating mathematical model.

He showed how it eloquently expressed the shape of the universe from sub quark structures to black holes and the cosmos as a whole.

Ted also bended this with the poems of an Chinese Taoists, Lao Tzu, who lived in China in the 6th century BC to show his intuitive understanding of what the universe is and is in. Lao Tzu called this underlying reality the Tao, which Ted explained, modern physicist are now calling the physical vacuum.

All in all an interesting and informative attempt at unlocking the mysteries of the universe....and what is the shape of the universe?? Well you had to be there to appreciate that!!

June Meeting:

SPECTROSCOPY

Spectroscopy was the title of the talk by Stuart Murray to the Tauranga Astronomical Society's meeting in May. It included a Power Point presentation as well as an edited video reinforcing visually, many of the facts looked at. (Edited version)

Spectroscopy – How light from stars and other stellar objects reveal their -
Composition,
Temperature,
Size,
Motion. (Towards us or receding)

The electrical magnetic spectrum encompasses an extremely wide range of wavelengths. At the lower end of this spectrum where the wavelengths can be measured in kilometers there are the radio frequencies up through the short wave then television bands, infrared, and then the visible light part of the spectrum. Beyond this the wavelengths are still getting increasingly shorter (10^{-9} part of a metre) or even higher frequencies - ultra violet, X rays Gamma rays, all becoming more dangerous because of their energy, the shorter they are, with their ability to act on physical substances.

The visible light, just a small part of this overall spectrum, contains wavelengths that activate receptors (rods and cones) on the eye's retina allowing us to perceive colour and brightness sensations. Because the cones, the colour receptors fall away in sensitivity as the light energy diminishes we cannot see colour in low light situations. The same generally applies to recording the various colour wavelengths from stars and stellar objects and hence the need for longish exposures for film / CCD. This is purely the result of fewer photons arriving at the recording / viewing point.

The white light we so describe coming from our sun for example, is a mixture of all wavelengths – that is from red, the longer wavelength, through the colour spectrum to blue at a shorter wavelength. This radiated energy, light, is considered as a stream of particles or photons radiating out from its source like a pebble dropped in a pond but of course as electro magnetic energy it doesn't require a medium to carry it.

Astronomical Spectroscopy began with Newton's observation of light from the sun dispersed through a prism displaying the colour spectrum we see today in many forms including of course a rainbow.

Fraunhofer, early 19th century, was a pioneer of spectroscopy. His name today is associated with absorption lines – dark bands that are seen in the spectra of the sun and other stellar objects.

It is from these bands that chemical make up, speed towards us or moving away, size, surface temperature, can be used for classifying stars into spectral types.

Three different types of spectra can be observed.

1 A continuous spectrum that shows a smooth flow of colour from the darkest blues to reds.

2 Absorption spectrum shows the full colour transition but with the dark bands that indicate less light, fewer photons arriving. These dark bands represent the chemical, element, molecular makeup of the source object.

3 Emission spectrum. Generally from a tenuous gas source, perhaps nebulae. This spectrum shows only the individual spectra of its chemical composition against a darker background.

As the result of laboratory work the wavelengths of the major elements etc are now so accurately known, and as we know throughout the Universe there is the same elemental composition, we have a sort of Rosetta stone for determining individual star make up.

Early experiments in absorption spectra (the bands of black lines representing the various chemical compositions) were displayed when lime was 'heated' producing 'limelight' – a brilliant white light that when split through a prism gave a continuous sweep of colours. When a sprinkling of sodium with its own specific yellow wavelength was peppered onto the heated lime, the lower temperature sodium absorbed the yellow wave length from within the lime spectrum. Through a prism dispersing the limelight, was seen a 'black D line' indicating the presence of the now recognized wave length for sodium.

Fraunhofer mapped over 570 absorption lines and discovered that each element was associated with a set of spectral lines. Today's observation of sunlight can detect many thousands of lines.

How Spectra are Produced.

An element's emission spectrum intensity is from electromagnetic radiation it emits when it is heated or excited.

When the electrons within the atoms are 'excited' they jump out to higher energy orbits. As the electrons fall back leaving this excited state, energy is re-emitted, a photon, the wavelength of which is related to that element, molecule – their atomic make up. Each atom has this unique set of wavelengths at which it absorbs or emits – its spectral response.

Energy can be absorbed or released from an atom when an electron moves to a higher or lower orbit.

The generation of light is called emission.

The removal of light from a beam of radiation is called absorption.

Using the sun as an example.

The sun's surface temperature is 6000 degrees Kelvin.

Because the atoms in heated higher densities such as liquids and solids are much closer together, they affect each others energy levels causing these levels to merge.

Overall they emit a smooth radiation over a wide range of wavelengths – a continuous spectrum.

However a cooler gaseous atmosphere surrounds the sun – the chromosphere. Included in this gas are metallic vapours from the sun's fiery surface.

The photons emitted from the sun's surface strike their related gaseous atoms in the chromosphere causing these electrons to jump outwards to a higher energy level thus absorbing that photon but re-emitting it when the electron drops back.

These new photons however do not travel in their original direction and hence a reduction in that wavelength's brightness – a darker band on the spectrum we observe – the absorption spectrum.

Colour / Temperature of Stars.

Stars are divided into classes according to their spectra, their chemical makeup and overall temperature.

Principal classes in decreasing temperature are OBAFKM – each letter again divided into 10 groups.

Our sun is G2 at 6000° K – yellow. O type have surface temp. at 30,000°K – bluish. M type have surface temp. at 3,000°K – red.

Though all the colours of the spectrum are there, the overall colour / temperature is centered around where the greatest colour /energy response is – ie. where a particular colour /wavelength is stronger than others.

If a piece of iron is heated it goes from black to a dull red glow, hotter still it is orange, yellow then blue/white. Both surface temperature and colour change together and to a certain degree both colour and temperature are the same. Not all elements follow this but common elements such as iron and tungsten as examples, closely do.

Star sizes – a rough guide.

Many stars fit into a pattern known as a 'main sequence' where the sun is used as a reference with a luminosity of 1. If 2 stars have the same surface temperature each star emits the same amount of light per sq. metre off its surface. Therefore if one star is more luminous than the other then it must be bigger with relative distances able to be measured. Super giants fit onto this pattern with high luminosity (brightness) but all lower (red)colour and temperatures – eg. Betelgeuse. White dwarfs are just the opposite – much lower luminosity but very hot : 12,000 to 20,000°.

Red Shift – Blue Shift. Doppler shift.

Stars and stellar objects approaching or receding from our solar system can be observed in the changed wavelength of radiation caused by the motion of the emitting body (source).

This shift is an increase in the wavelength, longer- lower frequency, if the source and observer move apart – red shift.

A decrease in the wavelength - shorter – higher frequency, if the source approaches the observer- blue shift.

This measure of velocity of movement to or from us can be observed – measured (Doppler shift) from the displacement, sideways either direction, of the known and calibrated spectral lines observed in the absorption spectrum.

So from the simple analysis of light from our sun, the stars in our galaxy, even exoplanets and other stellar objects, many critical features can be determined in the makeup of our Universe.



Stuart Murray June 09

New Committee, New Editor

We Thank Andrew Walker for his hard effort in putting together the previous Newsletters and as technical adviser for our equipment. You have been a great asset to the society and a pleasure to work with as a committee member.

I will continue from where Andrew left off with the newsletter and any correspondence can be sent directly to myself or Noel. Our email addresses are at the bottom page of this Newsletter.

Shaun Belcher
(Editor)

The Genesis of the Tauranga Astronomical Society

(By Jim Barrowclough)

As being the only active member of the Society from the early days of its inception, I was asked to do a small write-up of what I could remember and as my memory is like me and becoming aged I won't really have too much to write at all. The Tauranga Astronomical Society got its beginnings from the U3A astronomy group with a Mr. Denis Twiss coming to the U3A astronomy group to explain what it would be about and to ascertain the interest in forming an astronomical society.

As there was a reasonable interest it was decided to go ahead with the first two introductory meetings being held at the Bureta Hotel in late 2001 with Denis Twiss's three young friends taking the roles of chairman, secretary and treasurer with Denis Twiss and David Gordon making up the Trustees and signing the Trust Deed and put together by Lewis', solicitors of Cambridge. We shortly after obtained the services of Alan Tate of Harris/Tate, Tauranga as our solicitor. The word Trustee can also read as Society as worded in the Trust Deed. The Society became an Incorporated Society in March 2002. Our meetings were thereafter held at Julian Thatcher's home on Edgecombe Rd., near the 4th. Ave end and upstairs – it was while there that Jim Talbot started putting together our website, which he has continued to this day. <http://www.tauranga-astro.150m.com/> After a time we moved our meetings to Jim Talbot's residence for a period. As could be expected the venue for meetings have changed several times as has the committee and in more recent times to Stuart Murray's residence in Matua.

The Society has developed considerably since those early days, our first telescope, an 8" Meade was bought fairly early in the Society's existence with a 10" one following which we acquired from the family of Denis Twiss following his death. All this time we had thoughts of building an observatory - even looking at sites offered by the City Council at McLaren Falls Park but security was the greatest problem there – we were also given very sound advice not to build too far out of town as the public wouldn't travel far and as we wished to include the public in seeing the wonders of the solar system, the galaxy and beyond we would have to consider a site in the bounds of the city. A possible collaboration with Bethlehem College was considered which after several visits we decided to reject and concluded that the best site would be in Fergusson Park, close enough for all the residents and the schools of Tauranga to be able to enjoy the observatory which apart from the Port lights in the East had very little light intrusion.

A more recent coming together with the Soccer and Cricket Clubs and including the Scouts and Guides and the Astronomical Society saw the eventual combination of the Otumoetai Sport and Recreation Club which has spent the last two years negotiating with the City Council, raised all the required money and now at last all is set to upgrade the clubrooms which will include an excellent observatory, attached to the hall where we can have larger groups and complete with kitchen and toilet facilities – an excellent set-up. We have hopes of seeing it all finished before Xmas this year. Each group in the Otumoetai Sport and Recreation Club retains their individuality but as a combined group owns and operates the clubrooms in Fergusson Park.

Nearly two years ago the Astronomical Society obtained grants to allow us to purchase a 14" Meade telescope from America and after a long, long time it finally arrived and it

will eventually take pride of place in the new observatory. This one is completely computer and GPS controlled and will allow some of our members to do quite advanced research work.

I personally hope to see in a short time an astronomical society which is very professionally run and a credit to this city of Tauranga.

Jim Barrowclough, June 09



AN

EDITOR'S

NEWS FLASH!!
STARDOME TRIP

ON SUNDAY SEPTEMBER 20th
MEMBERS \$30 NON MEMBER \$40
WITH COMFORTABLE COACH SEATING
AN EXCLUSIVE SPECIAL STARDOME TOUR!
TICKETS & FURTHER DETAILS WILL BE AVAILABLE
AT CLUB MEETINGS HELD DURING JULY & AUGUST
STRICTLY LIMITED TO FIFTY TICKETS DON'T MISS OUT!

Matariki

Introduction:

The constellation of Matariki was culturally very important to Maori in traditional times. Its arrival early in June marked the coming of the Maori New Year. Matariki was studied closely to assist with seasonal cycle forecasts and this ensured that subsistent activities were conducted appropriately.

During Matariki, Maori sought nourishment in the physical, emotional and spiritual sense. It was a time for remembering, for giving, for sharing and for celebrating. Today it is these same sentiments that Maori and non-Maori aspire to when they celebrate Matariki



What is Matariki?

Matariki is the Maori name for the group of stars also known as the Pleiades star cluster or The Seven Sisters; and what is referred to as the traditional Maori New Year.

When is the Maori New Year?

The Maori new year is marked by the rise of Matariki and the sighting of the next new moon. The pre-dawn rise of Matariki can be seen in the last few days of May every year and the new year is marked at the sighting of the next new moon which occurs during June. This next occurs on 5 June 2008.

What does Matariki mean?

Matariki has two meanings, both referring to a tiny constellation of stars; Mata Riki (Tiny Eyes) and Mata Ariki (Eyes of God).

Why is Matariki important?

Traditionally, depending on the visibility of Matariki, the coming season's crop was thought to be determined. The brighter the stars indicated the warmer the season would be and thus a more productive crop. It was also seen as an important time for family to gather and reflect on the past and the future.

Why do we celebrate Matariki today?

Today Matariki means celebrating the unique place in which we live and giving respect to the land we live on.

How is Matariki celebrated?

Matariki is celebrated with education, remembrance and the planting of new trees and crops signalling new beginnings. Matariki was the optimum time for new harvests, and ceremonial offerings to the land-based gods Rongo, Uenuku and Whiro to ensure good crops for the coming year. It was also seen as a perfect time to learn about the land we live on and to remember whakapapa (ancestry) who have passed from this world to the next and the legacy they left behind.

Matariki is celebrated annually throughout New Zealand

Find out more about Matariki and other events taking place all over Aotearoa.

Northland - www.taitokerau.co.nz/matariki.htm
Hawkes Bay - www.matarikifestival.co.nz
Wellington - www.tepapa.govt.nz/Matariki
Toi Maori - www.maoriart.org.nz
Whanganui - www.puanga.org.nz
Maori Tourism - www.matarikievents.com
Te Taura Whiri - www.matariki.net.nz
Stardome Observatory - www.stardome.org.nz
Google Sky - www.google.com/sky
Te Ara - www.teara.govt.nz/EarthSeaAndSky/Astronomy/MatarikiMaoriNewYear



International year of Astronomy 2009

The Tauranga roving observers group participated in this international event in April with a great turnout from the public wanting to view the sky. It was a great experience to show people for the first time objects in the sky such as Saturn and the Orion Nebula.

For more info, visit:

<http://www.100hoursofastronomy.org/component/eventlist/report/1048>

For Sale

Telescope Mirror set. I have for sale the primary and secondary mirrors for a 6inch f 4.7 RFT (Rich Field Telescope). The primary mirror was made by myself and could use re-coating though is still serviceable. They are currently in a telescope so any prospective buyers can view before purchase, I will include the whole scope minus the focuser. This would make a good first scope for someone who does not have a lot of storage space or boot room in the car. Use it as it is or build your own scope around the optics.

Orthoscopic eyepieces. I have for sale brand new, Japanese made Orthoscopic eyepieces for \$80 a piece in 5,6,7,9,12.5 and 18mm focal lengths. These are excellent eyepieces of high quality that will last a lifetime if cared for. At this price they are cheaper than the wholesale rate from Japan! These are the same eyepieces offered by University Optics in the US.

For more information on any of the above phone Andrew Walker on 07 579-5656 or email andrew32walker@yahoo.com



BACK PAGE

The Tauranga Astronomical Society holds a monthly meeting on the fourth Wednesday of each month at the Otumoetai Soccer Club rooms, Fergusson Park, Tilby Dr, Matua. The meeting begins at 7.30pm and all are welcome.

New comers are invited to attend two meetings free of charge, however, after this a charge of \$5.00 per meeting will apply if membership of the society is not taken up.

Current membership fees are below and may be paid to the treasurer on any club night.

Full Time Student	\$15
Ordinary Membership	\$20
Family	\$30

Meetings consist of a presentation of roughly one hour either by a society member or an invited guest on an astronomical subject. After light refreshments this is followed by viewing through one of the society's telescopes, weather permitting, or the screening of an Astronomical DVD.

The Tauranga Astronomical Society Newsletter is published quarterly each January, April, July and October. Our editors welcome contributions from members provided they are on an Astronomy related subject and are original. Articles for the newsletter may be submitted electronically by email to: igreenman1@xtra.co.nz or sabelcher@value.net.nz

T.R.O.G (Tauranga Roving Observers Group)

TROG is a list of persons interested in observing from a dark sky site. We have been currently meeting approximately once a month at the editor's home in rural Te Puke. Another location previously used is Bell Road Papamoa and other sites are welcomed.

If interested in observing contact either Ursula Macfarlane 5767283 or Andrew Walker 5795656. The group is informal and no previous experience is required. Just bring along a telescope or binoculars if you have them, any star charts you might need and your enthusiasm.

Your Committee is:

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