



CAS MAG

The official magazine of the Canterbury Astronomical Society

www.cas.org.nz www.facebook.com/CanterburyAstronomicalSociety

Monthly Meeting: TUESDAY 19th NOVEMBER 2019

From 7:30p.m, room 701 on the 7th floor of the West building (Old Rutherford) (Physics and Astronomy) at the University of Canterbury (see page 4 for a detailed map).

Refreshments start at 7.30. Meeting starts at 8pm

NOVEMBER MEETING: JOHN DRUMMOND

Topic:

'E.E. Barnard, a 19th Century astrophotographer whose photos still 'wow' us.'

John Drummond became fixated with astronomy at the age of ten when his mother pointed out the Pot in Orion to him. From that moment on John was hooked on the universe. Joining the Junior Section of the Gisborne Astronomical Society not long after, John would regularly do group meteor watches, telescope viewing and listen to astronomy talks. John also developed an interest in photography, and it wasn't long before he combined the two interests and began astrophotography.

(More about John on Page 8)



CAS MEMBERS 2019 CHRISTMAS PARTY/BBQ

SATURDAY 7th DECEMBER. From 5.30pm

BBQ will start from 6-6.30pm) and CAS will supply meats, bread, sauces etc for the BBQ and ask those coming along to bring a salad/other food or dessert to share with those others attending. BYO Drinks,

Event will be held wet/or fine,
Look forward to seeing you
on the 7th December



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CAS Calendar, NOVEMBER 2019 – JANUARY 2020

November 2019

Tuesday 12th	Committee Meeting
Wednesday 13th	Full Moon
Friday 15th	Canterbury Show Day
Tuesday 19th	Members Meeting from 7.30pm
Wednesday 20th	Last Quarter
Saturday 23rd	Members Night at Observatory
Wednesday 27th	New Moon

December 2019

Wednesday 1st	First Quarter
Saturday 7th	CAS Christmas BBQ, Party from 5.30pm
Tuesday 10th	Committee Meeting
Thursday 12th	Full Moon
Thursday 19th	Last Quarter
Wednesday 25th	Christmas Day
Thursday 26th	Boxing Day
	New Moon
Tuesday 31st	New Years Eve

January 2020

Wednesday 1st	New Years Day
Friday 3rd	First Quarter
Saturday 11th	Full Moon
Saturday 18th	Last Quarter
Saturday 25th	New Moon

UPCOMING EVENTS:

November Members Meeting: Our last meeting for 2019
19th November 2019, Details on front page



Members Christmas BBQ:

Saturday 7th December from 5.30pm any questions can be emailed to myself (editor@cas.org.nz) or Carol (member2@cas.org.nz)

2020 Calendar:

18th February 2020: 1st Members Meeting Night for 2020,
Speaker and venue to be confirmed

21st-23rd February 2020: Staveley Stardate South Island

17th March 2020: CAS AGM Meeting

21st March 2020: Members Club Night at Observatory

Earth Hour 2020: Saturday 28th March at Observatory

Public Open Nights start April 3rd

Daylight Savings ends April 5th

Easter Weekend 10th-14th April

STAVELEY STARDATE SOUTH ISLAND 2020

The date has been set for 2020 Stardate South Island.

21st 22nd 23rd February, Friday 3pm - Sunday 2pm
at the Christian hostel and Camp at Staveley with the following
facilities, Full toilet and Showers, Bunkrooms, The auditorium, Full Kitchen
with shared fridges and freezer with plenty of space for tents and
caravans/campervans

Excellent horizons in all directions and heaps of room for many telescopes
\$20 per night per adult, 5-15 years \$5.00 per night under 5 free

***Euan has asked for anyone who wishes to give a talk to please
contact him, president@cas.org.nz***



Bookings will be available soon & notified
via Casmag and our website

MONTHLY MEETINGS:

Carol McAlavey has asked for you, our members to make suggestions or offer to give a talk at our monthly meetings

If you have any suggestions for topics please contact Carol via cstars@xtra.conz

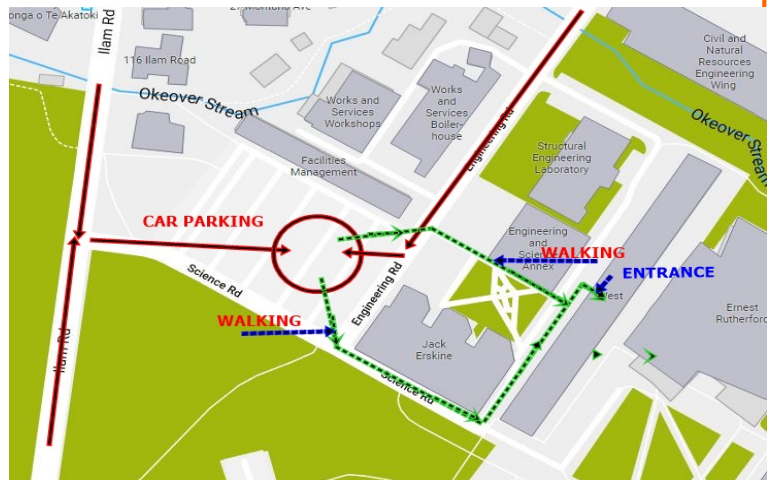
The meeting venue is now held in room 701 on the 7th floor of the West building (Old Rutherford) (Physics and Astronomy) of the University of Canterbury

Car parking is available in the car park with entrances in Science Road or Engineering Road.

Disabled parking is in Engineering Rd



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Upcoming Meetings

19TH NOVEMBER 2019

John Drummond

“E.E Barnard, A 19th Century Astrophotographer whose photos still WOW us all”

Cas holds no Members Meetings or Members Clubs Nights in December or January,

18TH FEBRUARY 2020

Members meeting, Speaker and Venue to be confirmed

(correct as at 10th November 2019, Subject to change as required)

Many thanks go to Orlon Petterson and Rosalie Reilly from the School of Physical and Chemical Sciences, University of Canterbury for arranging the meeting room for CAS this year

Also Thanks to Associate Professor Karen Pollard for organising the Lecture theatres for our public talks



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WELCOME TO OUR NEW MEMBERS:

A warm welcome to our new members, We look forward to meeting you at our meetings or events, Please make yourselves known to others. The following were accepted as members at the October Committee meeting

Welcome to:

Eboni Armstrong-Persad

John Pickering

Daniel Jury

It is always great to see our new members coming along to our Members Meetings, Members Nights and Events.



OBSERVATORY NEWS

ALARM AT THE OBSERVATORY

The installation of our ALARM at the observatory is now fully operational, Ask a committee member for the password.

INTERNET WI-FI:

Ask a committee member for the password

GARDENING/LAWNS:

Thanks to those who helped with the last lot of planting, Terry is away for the months of December and part of January so If you have spare time, the lawns will need doing (check with either Rob, Tracey or Dale if you would like to help) contacts on website or page 16 in this issue

LASER POINTERS:

There is a legal requirement when importing them, and information is on our website and at the observatory,

CAS has a drafted a set of guidelines which we will present at the AGM to be added to our By-Laws,

If you need a letter confirming your membership for your application, please contact either membership secretary or secretary, (This letter will state you are a current financial member of our society)

From Your Editor

Welcome to your new look CASMAG

I am always looking for items or photos to include in YOUR CASMAG So please email your Article or favourite photo with details for me to include in future issues.

Remember you can have your advert added in the future casmag's, Contact me for detail's

Please email to editor@cas.org.nz

Dale Kershaw

METEOR SHOWERS FOR 2019

Shower	Dates		Moon	Peak Rate	RA	Dec	Near Star
	Active	Peak	2019				
Centaurids	Jan 28 - Feb 21	Feb 8	3 days after New moon	5 (-25)	14.1	-59	β Cen
gamma-Normids	Feb 25 - Mar 22	Mar 13	1 day before First quarter	8	16.6	-51	γ Nor
pi-Puppids	Apr 15 - Apr 28	Apr 23	4 days before Last quarter	var to 40	7.3	-45	σ Pup
eta-Aquariads	Apr 19 - May 28	May 5	New moon	60	22.5	-1	η Aqr
Pisces Austrinids	Jul 15 - Aug 10	Jul 27	2 days after Last quarter	5	22.7	-30	α PsA
alpha-Capricornids	Jul 3 - Aug 15	Jul 30	2 days before New moon	4	20.5	-10	α Cap
Southern delta-Aquarids	Jul 15 - Aug 25	Jul 27	5 days before New moon	20	22.6	-16	δ Aqr
Southern iota-Aquarids	Jul 25 - Aug 15	Aug 4	3 days after New moon	2	22.3	-15	ι Aqr
Northern delta-Aquarids	Jul 15 - Aug 25	Aug 13	3 days before Full moon	4	22.3	-5	θ Aqr
Northern iota-Aquarids	Aug 11 - Aug 31	Aug 19	3 days after Full moon	3	21.8	-6	β Aqr
Piscids	Sep 1 - Sep 30	Sep 19	3 days before Last quarter	3	0.3	-1	λ Psc
Orionids	Oct 2 - Nov 7	Oct 21	1 day before Last quarter	20	6.3	+16	γ Gem
Leonids	Nov 14 - Nov 21	Nov 17	3 days before Last quarter	100+	10.2	+22	γ Leo
alpha-Monocerotids	Nov 15 - Nov 25	Nov 27	New moon	var to 5	7.9	+1	δ Mon
Pheonids	Nov 28 - Dec 9	Dec 6	2 days after First quarter	var	1.2	+53	Achernar
Geminids	Dec 7 - Dec 14	Dec 14	2 days after Full moon	120	7.3	+33	Castor

Information from the Royal Astronomical Society New Zealand website <http://www.rasnz.org.nz>

2020 Conference and RASNZ Centenary

The 2020 Conference will be held 8-10 May at Wellington with the Wharewaka Function Centre the venue (near the Michael Fowler Centre) in downtown Wellington.

The Wellington Astronomical Society is hosting this conference.

2020 marks a significant milestone in the life of the Society as it was founded in November 1920 with 75 members.

The SCC invites ideas from members how the Society might commemorate its centenary at next year's conference.

Please send your suggestions to the SCC at

conference@rasnz.org.nz.

NOTES FROM YOUR COMMITTEE

SIGNING IN WHEN YOU ARE AT THE OBSERVATORY

Please remember to sign in the book on the table in the Lodge whenever you are out at the observatory, This helps give us an idea of who has been using the equipment etc, even if you are out there to do gardening or the like PLEASE SIGN THE BOOK and add what you have been doing, Also please note and issues that have happened or that need fixing, and its good to follow that up with a email or phone call to Terry or the committee

ACCREDITATION

A reminder that unless you have full accreditation on the equipment you are not to use the equipment unless there is an accredited person with you

LASER USE POLICY/GUIDELINES:

Please see notes in Observatory news re this on page 5.

We have been advised that ASTRONZ is able to sell lasers to our members (you still require a member letter) and have them in stock so contact Andrew directly either by phone [09 473 0203](tel:094730203) or email sales@astronz.nz Remember to tell them you are a CAS member and CAS receives a referral donation from them

Canterbury Astronomical Society would like to acknowledge the following

Trees for Canterbury for the donation of trees and shrubs, which were planted along the bank,

AND

Southern Woods

for discounted trees to replace the trees that were cut down over the last summer holidays



CAS Membership Subscriptions for 2020-2021

NEXT YEARS MEMBERSHIP SUBSCRIPTIONS WILL BE DUE FROM 1ST APRIL 2020

Discounted fees until 31st May 2020

Please use your name and member number as a reference when banking, then email membership@cas.org.nz to advise so payments can be matched to you correctly.

PLEASE also include any changes to your contact details (eg: phone, email, address)

Full details are included on the last page of this newsletter.

You are also welcome to pay by cash or cheque at our monthly meetings.



John Drummond Introduction Cont

John's photos have been used in many overseas books and magazines – and were used on two NZ stamps. He was the director of the Royal Astronomical Society of New Zealand Astrophotography Section for thirteen years until 2018.

John lives about 10km west of Gisborne and has a range of telescopes up to 0.5 metres in diameter. He regularly images with these scopes and CCDs and also gets astrometry of comets, asteroids and NEOs which are sent to the IAU Minor Planet Section.

In 2018 he got 466 observations (the 2nd highest number of observations taken in New Zealand - Mount John being the most). He has also confirmed several comets. His Possum Observatory code is E94. John has also co-discovered about 20 exoplanets in collaboration with the Ohio State University – including the unusual 2-Earth-massed planet orbiting a binary star which helped astronomers rethink planetary formation models. This was published in *Science*. John is listed as an author in over 60 journal publications.

He is also a contributing editor for the *Australian Sky and Telescope* magazine (there's an article about him in the latest issue).

John Drummond was the President of the [Royal Astronomical Society of New Zealand](#) from 2016-2018 and is currently that Society's Executive Secretary.

In 2016 John received his Master of Science (Astronomy) from Swinburne University. In 2019 he was made a Fellow of the Royal Astronomical Society of New Zealand.

When not doing astronomy, John is a science teacher.

He also enjoys surfing the great waves of Gisborne and pottering around on his small farm tending to his sheep.

John Drummond
November 2019



STREET LIGHT FRIGHT—BY SYLVIE KING

Thanks to Sylvie King (age 12 years) for sharing this with us, from her “2019 NIWA Canterbury-Westland School Science Fair Entry”

One of the many things I’ve learned from being a member of the Astronomical Society, was about how humans see the stars.

I learnt how seeing bright white light can affect your night vision and your ability to enjoy the night sky. I started thinking about how light can not only affect our eyes but also our circadian rhythms, sleep and our overall growth.

I also learned that the new street lights that are being installed in Christchurch are very bright and are almost causing constant daylight due to the LED bulb being the high kelvin—4000k. This is a more ‘blue’ light which is already known to have negative impacts on humans (see the Royal Society report on blue light on their website).

So these new street lights mean that it is becoming increasingly difficult to see the stars and as it also means that the environment around the lights is not getting darkness and is being exposed to a different kind of light than what it was previously, so I wondered if this might have an impact on their growth.

I designed an experiment to test whether there was any effect on the growth on some young native plants if they were exposed to different night lights—as if they were under a street light all night.

I bought 4 lamps and put in LED lightbulbs with different kelvins: 2000k, 2200k, 3000k and 4000k. I also had no light as a control.

I then bought 15 baby pittosporum tenuifolium native plants; three for each light. I chose pittosporum because they were readily available and they are local to our region.

I placed a cardboard box over the lights at night to ‘contain’ the light and turned the lamps on as if they were the street lights. I took the boxes off and turned the lights off during the day, and exposed them all to the same sunlight conditions. They were planted in the same potting mix, watered the same, were in the same temperature and so on to try to control all the other variables. I put the lamps and boxes on all night every night. I ran this experiment of night light for two months.

I measured the plants weekly by growth and found the average growth of the three plants assigned to the one light, to gather the data to show me what effect the night light had on growth (if any). The results showed that the plants beneath the 4000k light actually grew the *least*, while the plant beneath the 2000k light caused the plants to grow more than the control of no light at all which recorded the second highest growth.

[Continued on next page](#)

STREET LIGHT FRIGHT—BY SYLVIE KING *Continued*

The Astronomical society made me aware of the Dark Sky campaign, which was campaigning for 2200k and 2000k lights to be used instead of the 4000k lights, and my data indicates that these will be better not only for stargazing, but for the effect on our native flora.

I think this experiment would be worth repeating as a larger experiment with other species of flora. It was a really interesting result.

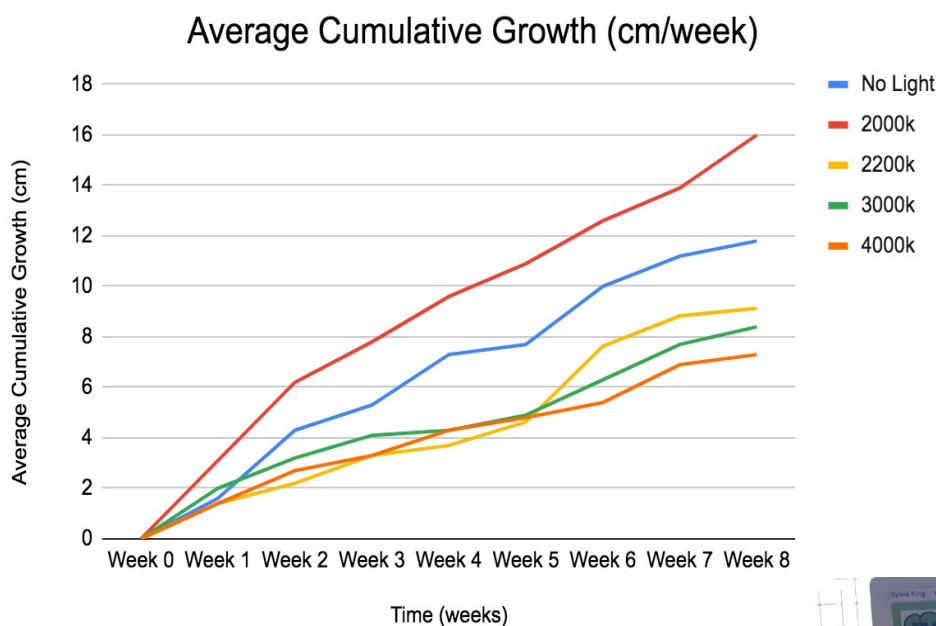
I'd like to thank the members of the Astronomical Society for spurring my interest in the night sky and the impact that we have on our environment and resources.

At the 2019 NIWA Canterbury-Westland School Science Fair, Sylvie received:

The Royal Society of New Zealand Award for excellence in experimental design, approach and interpretation;

The Canterbury Botanical Society Award for best investigation into native plants or vegetation;

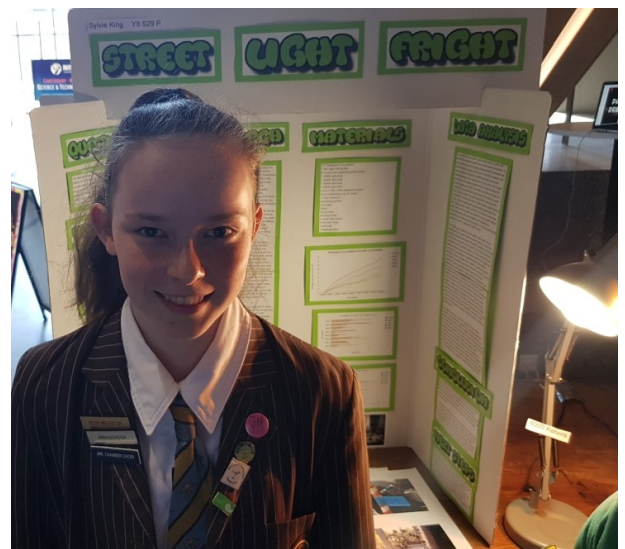
& The Environment Canterbury Years 7-8 Second Prize for outstanding scientific and technological investigation into ways to protect and enhance Canterbury's natural or physical resources.



Growth chart showing details of data collected

Photo: Natalie King

Many thanks to Sylvie for your written report and Natalie (mum) for submitting this report, and congratulations on your awards / prizes.
Your Editor.

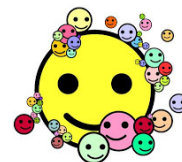


PHOTOS FROM OUR MEMBERS PAGE

This months featured photos are of our new Flags and Banners and Stickers
Keep an eye out for them at our meetings and events



With many thanks to Tracey for her amazing efforts and hard work she has put into our new Logo, Flags and Banners, etc,



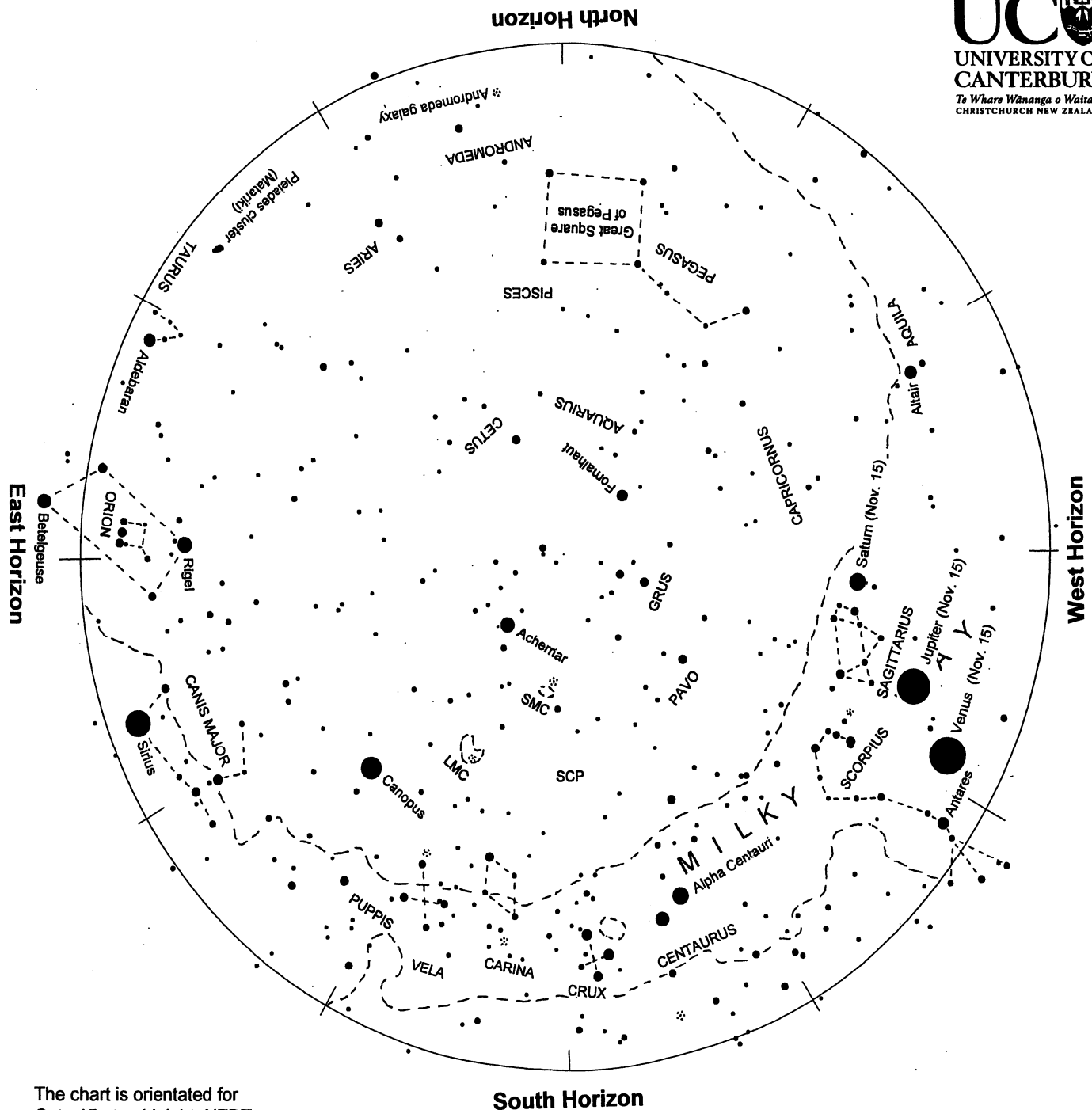
Tracey, Rob and Simon with our display at the Transitional Cathedral for the Mercury Rising Event 6th November



Above: Cas sticker on my car

Left:
Simon beside the CAS Flag, which we used his image, Fighting Dragons

Photos: Editor



The chart is orientated for
Oct. 15 at midnight NZDT
Nov. 1 at 11 p.m. "
Nov. 15 at 10 p.m. "

Evening sky in November 2019

To use the chart, hold it up to the sky. Turn the chart so the direction you are looking is at the bottom of the chart. If you are looking to the south then have 'South horizon' at the lower edge. As the earth turns the sky appears to rotate clockwise around the south celestial pole (SCP on the chart). Stars rise in the east and set in the west, just like the sun. The sky makes a small extra clockwise rotation each night as we orbit the sun.

Silver Venus and golden Jupiter light up the western sky at dusk. Saturn is above them. Mercury is beside Venus on the 1st but soon sinks lower in the twilight. Jupiter and Saturn move slowly down the sky. Around the 23rd Jupiter and Venus make an eye-catching pair. Canopus is midway up the southeast sky. Sirius, the brightest true star, appears in the east. Left of Sirius is Orion containing 'The Pot'. Further left are Taurus and the Pleiades/Matariki star cluster. The Pointers and Crux, the Southern Cross, are low in the south. The Milky Way is wrapped around the horizon. The north sky is empty but for the Great Square of Pegasus with the Andromeda galaxy below and right of it.

The Evening Sky in November 2019



Bright planets light up the western evening sky while bright stars appear in the east. Soon after sunset brilliant **Venus** appears in the west. It is followed by **Jupiter**, seen above Venus. As the sky darkens Saturn appears well above Jupiter, in line with Jupiter and Venus. On November 1st **Mercury** will be left of Venus but much fainter. It quickly falls lower in the twilight, disappearing in the first week of the month (so isn't on the chart.) Venus sets about two hours after the Sun through the month. Jupiter and Saturn slip down the sky toward Venus. Around the 23rd golden Jupiter and silver Venus will make an eye-catching pair. They will be less than two degrees apart, in the same binocular view.

On the 2nd the Moon will cross in front of Saturn in the twilight. From Dunedin the planet will disappear behind dark side of the Moon at 8:47 pm and reappear on the bright side at 9:51; from Christchurch 8:55, 9:55; Wellington 9:03, 9:58; New Plymouth 09:09, 9:58; Gisborne 09:12; 10:03; Hamilton 9:14, 9:59; Auckland 9:18, 9:58; Whangarei 9:23, 9:56; North Cape 9:33, 9:41. On the evening of the 28th the thin crescent Moon will be just below Jupiter. It crosses over the planet after the two have set from NZ.

Canopus, the second brightest 'true' star is well up the southeast sky at dusk. **Sirius**, the brightest star, rises a little south of east. It appears in the later evening at the beginning of the month. By month's end it is in the sky at dusk, twinkling like a diamond as the air disperses its white light. Right of Sirius is the triangle of bright stars that make the big dog's hind quarters.

Left of Sirius is the constellation of **Orion**, with 'The Pot' at its centre. **Rigel**, a bluish supergiant star, is directly above the line of three stars; **Betelgeuse**, a red-giant star, is straight below. Left again is orange **Aldebaran**. It is at one tip of a triangular group called the Hyades cluster. The Hyades and Aldebaran make the upside down face of **Taurus** the bull. Still further left is the **Pleiades** or **Matariki** star cluster, also called The Seven Sisters, Subaru and many other names. Six stars are visible to the eye; many more are seen in binoculars. The cluster is 440 light years* away and around 70 million years old.

Sirius is the brightest star both because it is relatively close, nine light years away. Seen up close it would be 23 times brighter than the sun. By contrast, Canopus is 300 light years away and 13 000 times brighter than the sun.

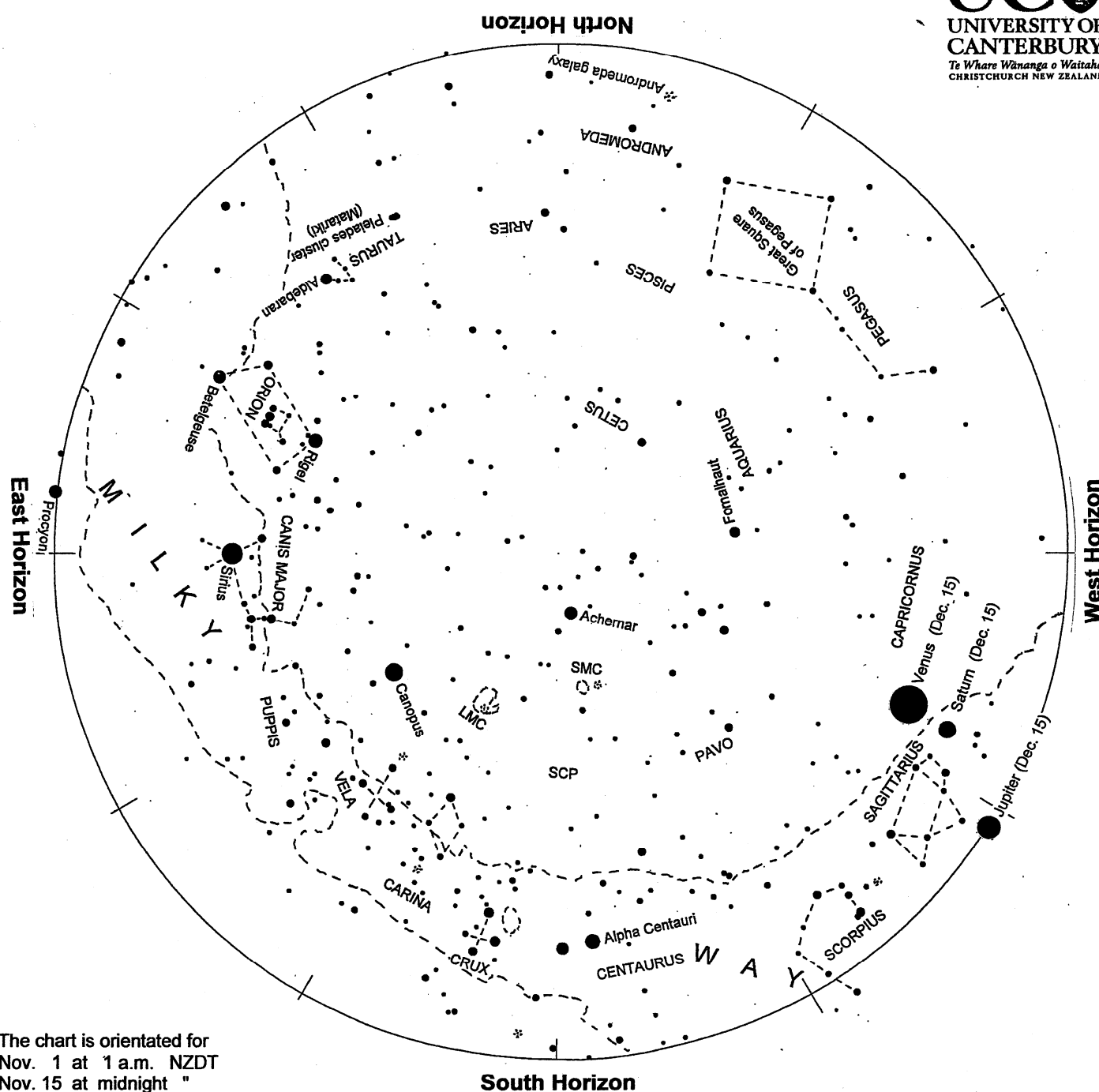
The **Milky Way** is low in the sky, visible around the horizon from the northwest, through west and south and around into the eastern sky. It is our edgewise view of the galaxy, the pancake of billions of stars of which the Sun is just one. The broadest, brightest part is in **Sagittarius** in the west between Jupiter and Saturn. That's where the thick hub of the galaxy lies, 30 000 light years away, mostly hidden by clouds of smoke-like dust. The thin nearby edge of the Milky Way is below **Orion** on the opposite side of the sky.

Low in the south are the Pointers, Beta and **Alpha Centauri**, and **Crux** the Southern Cross, upside down. In some Maori star lore the bright southern Milky Way makes the canoe of Maui with Crux being the canoe's anchor hanging off the side. In this picture the hook of the Scorpion's tail, left of Jupiter, is the canoe's prow and the Clouds of Magellan are its sails. Alpha Centauri is the closest naked-eye star; 4.3 light years away. It is actually two Sun-like stars orbiting each other in 80 years.

The Clouds of Magellan, (**LMC** and **SMC**), high in the southern sky, are two small galaxies about 160 000 and 200 000 light years away, respectively. They are easily seen by eye on a dark moonless night. The larger Cloud is about 1/20th the mass of the Milky Way galaxy, the smaller Cloud 1/30th. That's still billions of stars in each. The globular star cluster 47 Tucanae looks like a slightly fuzzy star near the top-right edge of the SMC. It is 'only' 16 000 light years away and merely on the line of sight to the SMC. Globular clusters are spherical clouds of stars many billions of years old.

Very low in the north is the **Andromeda Galaxy**. It appears as a spindle of light, faintly visible to the eye in a dark sky and easily seen in binoculars. It is similar in size and shape to our galaxy but is a little bigger and nearly three million light years away.

*A **light year (l.y.)** is the distance that light travels in one year: nearly 10 million million km. Sunlight takes eight minutes to get here; moonlight about one second. Sunlight reaches Neptune, the outermost major planet, in four hours. It takes sunlight four years to reach the nearest star, Alpha Centauri.



The chart is orientated for
Nov. 1 at 1 a.m. NZDT
Nov. 15 at midnight "
Dec. 1 at 11 p.m. "
Dec. 15 at 10 p.m. "

Evening sky in December 2019

To use the chart, hold it up to the sky. Turn the chart so the direction you are looking is at the bottom of the chart. If you are looking to the south then have 'South horizon' at the lower edge. As the earth turns the sky appears to rotate clockwise around the south celestial pole (SCP on the chart). Stars rise in the east and set in the west, just like the sun. The sky also shows a small extra clockwise rotation each night as we orbit the sun.

Brilliant silver Venus and golden Jupiter appear low in the west soon after sunset. Fainter Saturn is near them. Due east is Sirius, the brightest star, twinkling like a diamond. Left of it is Orion, with 'The Pot' at its centre. Bright Rigel is above the Pot and reddish Betelgeuse below. Left of Orion is orange Aldebaran with a V-shaped cluster making the face of Taurus the Bull. Further left is the Pleiades/Matariki/Seven Sisters star cluster. The Pointers and Crux, the Southern Cross, are low in the south. Right of Canopus, the second brightest star, are the Clouds of Magellan (LMC and SMC on the chart), two small nearby galaxies. The Great Square of Pegasus spans the lower northern sky with the Andromeda Galaxy below and right of it.

The Evening Sky in December 2019



Bright planets appear in the western evening sky soon after sunset. On December 1st, golden **Jupiter**, brilliant silver **Venus**, and fainter **Saturn** are equally spaced in a line up the sky. Jupiter and Saturn slip lower through the month but Venus holds its position, setting two hours after the sun. Around the 9th Saturn will be right of Venus. The crescent moon is near Venus on the 29th.

The brightest true stars are in the east and south. **Sirius**, the brightest of all the stars -- but much fainter than Venus -- is due east at dusk, often twinkling like a diamond. Left of it is the bright constellation of **Orion**. The line of three stars makes Orion's belt in the classical constellation. To southern hemisphere skywatchers they make the bottom of 'The Pot'. The faint line of stars above the bright three is the Pot's handle or Orion's sword. At its centre is the Orion Nebula, a glowing gas cloud nicely seen in binoculars. **Rigel**, directly above the line of three stars, is a hot blue-giant star 770 light years* away. Orange **Betelgeuse**, below the line of three, is a cooler red-giant star 430 light years away.

Left of Orion is a triangular group making the upside down face of **Taurus** the bull. Orange **Aldebaran**, at one tip of the V shape, is one eye of Taurus. The stars on and around the V, except for Aldebaran, are the Hyades cluster. It is 150 light years away. Aldebaran is not a member of the cluster. It just happens to be on the line-of-sight at about half the cluster's distance. Further left is the **Pleiades/Matariki/Subaru** cluster, a tight grouping of six naked-eye stars impressive in binoculars. It is 440 light years away.

Canopus, the second brightest star, is high in the southeast. Low in the south are the Pointers, Beta and **Alpha Centauri**, and **Crux** the Southern Cross upside down at this time of the year. In some Maori star lore the bright southern Milky Way makes the canoe of Maui with Crux being the canoe's anchor hanging off the side. In this picture the Scorpion's tail, just setting, can be the canoe's prow and the Clouds of Magellan are the sails.

The **Milky Way** is wrapped around the horizon. The broadest part is in **Sagittarius** low in the west at dusk. It narrows toward Crux in the south and becomes faint in the east below Orion. The Milky Way is our edgewise view of the galaxy, the pancake of billions of stars of which the sun is just one. The thick hub or central bulge of the galaxy, is 30 000 light years away, in Sagittarius, near Jupiter's position. The nearby outer edge is the faint part of the Milky Way below Orion. A scan along the Milky Way with binoculars finds many clusters of stars and a few glowing gas clouds.

The Clouds of Magellan, **LMC** and **SMC**, high in the southern sky, are two small galaxies about 160 000 and 200 000 light years away, respectively. They are easily seen by eye on a dark moonless night. The larger cloud is about 1/20th the mass of the Milky Way galaxy, the smaller cloud 1/30th but that is still many billions of stars in each.

Very low in the north is the **Andromeda Galaxy**. In binoculars in a dark sky it looks like a spindle of light. It is a bit bigger than our Milky Way galaxy and nearly three million light years away.

Early risers should see Mars low in the eastern dawn sky. It looks like a medium-bright reddish star all on its own. Mercury is below and right of it, brighter than Mars but lower in the twilight.

*A **light year (l.y.)** is the distance that light travels in one year: nearly 10 million million km. Sunlight takes eight minutes to get here; moonlight about one second. Sunlight reaches Neptune, the outermost major planet, in four hours. It takes sunlight four years to reach the nearest star, Alpha Centauri.

CAS COMMITTEE AND OFFICERS 2019/2020

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	Mak Matthews	member1@cas.org.nz
	Marc Bunyan	member3@cas.org.nz
	Tracey Richards	member4@cas.org.nz
	Malcolm Flain	casweb@cas.org.nz

For more specialized information please see the contact information page on www.cas.org.nz

CAS Contact Information

Canterbury Astronomical Society Inc.

PO Box 25-137

City East

Christchurch 8141

Web: www.cas.org.nz

Canterbury Astronomical Society Facebook Group:

www.facebook.com/groups/CanterburyAstronomicalSociety

West Melton Observatory: 43° 29' 55.5" S, 172° 20' 59.0" E 218 Bells Road, West Melton

CAS Members Meetings:

The CAS monthly members meetings are currently held from 7.30pm onwards every third Tuesday of the month (except December and January) in Room 701 on the 7th floor of the WEST BUILDING (old Rutherford) Physics and Astronomy at the University of Canterbury,
Any member of the public who is considering in joining the society are most welcome to attend the meetings.

CAS on Facebook:

Cas has a Facebook presence, Useful to keep up to date with events, interesting articles, asking for advice, For members please use the website forums for more detailed information etc

CAS Membership:

Subscriptions are due 1st April each year

Fees for current members who renew before 31st May are at the discounted price shown on the membership form included on the back page of your Casmag, Full details are included on our website.

Contributions to CASMAG:

Member contributions to CASMAG are always most welcome (letters, observing notes, articles, news)

Please submit articles by email to editor@cas.org.nz

The deadline for each issue is the 1st of each month

Small personal advertisements are free to financial members, (less than 8 lines in a column)

Charges for larger items range from \$5 to \$40, email the editor for more details.

The Constitution of The Canterbury Astronomical Society Inc:

This is available on request, Please ask for a copy if required

DISCLAIMER:

This newsletter is for general information purposes only. The views expressed herein are not necessarily those of the Canterbury Astronomical Society Inc (CAS)

CAS has taken all reasonable measures to ensure that the material contained herein is correct, but gives no warranty for, and accepts no responsibility for its accuracy or completeness.

Readers are advised not to rely solely on this information, and should seek independent advice before making any decision, CAS reserves the right to make changes at any time, as deemed necessary.

Canterbury Astronomical Society Inc

APPLICATION FOR MEMBERSHIP

To: Membership Secretary
Canterbury Astronomical Society Inc.
P.O.Box 25-137
City East
Christchurch 8141



Applicants Name in Full _____

Address: (Note a P.O.Box is NOT a legal address) _____

Home Phone: _____ Cell Phone: _____

Email: _____ Date of Birth: (if under 18) _____

Membership Category (tick, subscripton must accompany application)**Discounted if Membership is renewed before 31st May****Online Banking Details (Please identify your payment):** 03 0802 0098273 00

	Discounted	Full
<input type="checkbox"/> Adult (any person 18years of age or over who is not eligile for any other category)	\$70	\$80
<input type="checkbox"/> Family (two or more persons living at the same address)	\$105	\$120
<input type="checkbox"/> Junior (under 18 years of age on 1st April in the current year)	\$35	\$40
<input type="checkbox"/> Senior (over 65 Years)	\$35	\$40
<input type="checkbox"/> Community Services Card Holder	\$35	\$40
<input type="checkbox"/> Student (any person studying full-time at a tertiary instition, must reapply annually)	\$35	\$40
<input type="checkbox"/> Corporate (members have voting rights of one member, but cannot take office)	\$210	\$240

Name:	Date of Birth(if Under 18yrs)	Signature

All CAS members receive CASMAG a monthly newsletter, Would you prefer to receive this (please tick)

☐ by email as a PDF attatchment ?
 ☐ or by post as a hard copy?

Do you have access to a telescope? What type and size? _____

I the undersigned declare that the information given herein is true.

Signature: _____ Date: _____

By signing this application the applicant agrees to comply with the Constitution and By-Laws
 of the Canterbury Astronomical Society Inc.

Date Approved: _____