NOVA
NEWSLETTER OF THE VANCOUVER CENTRE RASC
VOLUME 2018 | ISSUE 2 MARCH APRIL 2018

Blue, Blood, and "Supermoon" Eclipse

by J. Karl Miller

On January 31, 2018 morning, I got up to have a look at, and take some pictures of, the total lunar eclipse which has been hyped as the "blue, blood, eclipsed Super Moon." As the weather gods would have it, there were variably transparent clouds everywhere. I took a total of 356 pictures, many of which were of poor quality because of this. To control the camera, which was attached to a tracking mount, I used my 27" iMac, loaded the Canon EOS control program, and connected the camera to one of the computer's USB ports. The program allows remote control of various camera functions, including exposure and ISO ratings.

I set up the Canon 60Da camera at the window inside my office. This window is on the west side of our house and fortuitously looks out on that part of the sky in which the eclipse took place. An old Pentax 200mm and a 2x Barlow lens (both Pentax threads) resulted in an effective 400mm telephoto lens; this combination was attached to the 60Da by means of Pentax-thread-to-Canon adapter. In order to get reasonable quality images, I opened the office window, and took out the mosquito screen. That meant that the office got really cold; when daylight arrived, there was frost on the rooves of houses and frosty cars. To make this 5-hour photo session more comfortable, I set up my MacBook Pro laptop, using VNC, to communicate with the iMac in the office over my internal computer network.

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MARCH 8 SFU	APRIL 12 SFU	MAY 10 SFU
Robert Conrad (charting and star-hopping) and Matt Cimone (Chasing Atlantis). See Meetup for full details. Room AQ3159 SFU	Dr. John Walker from TRIUMF. See Meetup for details. Room TBA SFU	Retired astronomy professor from Okanagan Centre, Richard Christie. See Meetup for details. Room TBA SFU

Kidney Transplant Needed by RASC Member

The following letter is from longtime RASC Vancouver member Barry Shanko to let you know about his current health challenges and how you can help. Barry has been a wonderfully generous volunteer for our activities. In particular, as our Speakers Chair for many years, Barry ensured an interesting series of talks at our public lectures. Barry needs a new kidney, and we hope you will consider being tested to be a living donor.

Dear Fellow Members of the Vancouver Centre:

In reaching out to you I have to say this is the hardest letter I've ever had to write. My kidneys have failed and I undergo dialysis three times a week. This is a temporary fix; the best long term solution is a kidney transplant.

The waiting time for a deceased donor kidney is years and I have been advised to try and find someone who would be willing to donate one of their kidneys to me. I'm writing this letter with the hopes that you or someone you know will come forward to volunteer to be tested as a first step towards donation.

I understand this is a huge request, and I want you to be totally comfortable with your decision. No matter what you decide, I will respect it. If you are comfortable with saying yes, I hope you will consider stepping forward to be tested.

Life with dialysis is not easy. I need treatment three times a week, four hours per session. This is a great hit to my lifestyle, meaning that I have to plan my life around my appointments. It is almost as though I was attached to the machines via a leash. For example, on work days when I have dialysis, I leave for work at 7:30 am, but don't get home until almost 10 in the evening. A new kidney would eliminate these restrictions and return me to a normal life.

This is also a hard thing for me personally. My mom died from kidney failure. She wasn't able to have a transplant and eventually the dialysis stopped working. Her last few years were a constant cycle of dialysis and then rest until the next session. It wasn't much of a life.

I've learned kidney donors are about to live normal and healthy lives with just a single kidney. Donors are carefully screened to make sure it is safe for them to give up a kidney. The testing is comprehensive and only if you pass the tests will you be asked to take the next step to donation. The transplant team makes the donor's health and well-being a priority. Donors don't have to be a relative, or even have the same blood type to volunteer. And should the worst happen and your single kidney fails, as a live donor, you would go straight to the top of the transplant list without having to wait in line.

I know I've given you a lot to think about. If you are interested in exploring the idea of a kidney donation and want more information, I'd urge you to start by checking out the BC Transplant website [www.transplant.bc.ca] or contact the VGH pre-transplant clinic at 604-875-5182 for more information. Just asking for information is not a commitment to going forward with it and you can stop at any point in the process. All of your contacts and information will be kept in the strictest confidence.

If you'd like, I'd be happy to talk with you confidentially about this and pass along more information.

Thank you for letting me share my information. If you know of someone you think would be interested in donating, feel free to pass this letter along to them. The wider the net, the better my chances.

Sincerely,
Barry Shanko

President's Message

by Leigh Cummings

Greetings fellow star gazers. We have once again witnessed SpaceX making history, this time by launching their Falcon 9 Heavy rocket and the successful return of two of its three boosters. Amazing! As a bonus, the payload was a red Tesla sports car which was flung into a Hohmann orbit between Mars and Earth. (All that was missing was James Bond. Q would have been so happy.) Now I read that SpaceX is attempting to catch a returning payload fairing. Talk about the three Rs of garbage reduction. Not only does SpaceX reuse its Falcon 9 boosters, they now want to reuse the $6 million dollar payload fairings as well. To accomplish this, they have re-purposed an oil rig service vessel named Mr. Steven to do just that.

The idea is to equip the giant fairings with onboard thrusters and a guidance system to bring them through the atmosphere intact and then use a parafoil to glide them to within catching distance of Mr. Steven. Mr. Steven is equipped

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About RASC

The RASC Vancouver Centre meets at 7:30 PM on the second Thursday of every month at SFU's Burnaby campus (see map on page 4). Guests are always welcome. In addition, the Centre has an observing site where star parties are regularly scheduled.

Membership is currently $78.00 per year ($45.00 for persons under 21 years of age; family memberships also available) and can be obtained online, at a meeting, or by writing to the Treasurer at the address below. Annual membership includes the invaluable Observer's Handbook, six issues of the RASC Journal, and, of course, access to all of the club events and projects.

For more information regarding the Centre and its activities, please contact our P.R. Director.

NOVA, the newsletter of the Vancouver Centre, RASC, is published on odd-numbered months. Opinions expressed herein are not necessarily those of the Vancouver Centre.

Material on any aspect of astronomy should be e-mailed to the editor or mailed to the address below.

Remember, you are always welcome to attend meetings of Council, held on the first Thursday of every month at 7:30pm in the Trottier Studio in the Chemistry wing of the Shrum Science Centre at SFU. Please contact a council member for directions.

2018 Vancouver Centre Officers

President Leigh Cummings
president@rasc-vancouver.com

Vice-President Gordon Farrell
vp@rasc-vancouver.com

Secretary Olivier Eymere
secretary@rasc-vancouver.com

Treasurer Phil Lobo
treasurer@rasc-vancouver.com

National Rep. Kenneth Lui
national@rasc-vancouver.com

Librarian William Fearon
library@rasc-vancouver.com

Public Relations Scott McGilllivray
publicrelations@rasc-vancouver.com

LPA Pascal Pillot-Bruhat
lpa@rasc-vancouver.com

Dir. of Telescopes Don Duthie, Ken Arthurs
telescopes@rasc-vancouver.com

Observing Robert Conrad
observing@rasc-vancouver.com

Membership Suzanna Nagy, Francesca Crema
membership@rasc-vancouver.com

Events Coord. Jeremy van den Driesen, Hayley Miller
events@rasc-vancouver.com

Education Robert Conrad, Tim Stephenson, Andrew Krysa
education@rasc-vancouver.com

AOMO Alan Jones
aomo@rasc-vancouver.com

Merchandise Kyle Dally
merchandise@rasc-vancouver.com

Webmaster Ken Jackson
webmaster@rasc-vancouver.com

NOVA Editor Gordon Farrell
novaeditor@rasc-vancouver.com

Speakers Scott McGilllivray
speakers@rasc-vancouver.com

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At Large Howard Trottier, Bill Burnyeat, Isabelle Eymere

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Library

The centre has a large library of books, magazines and old NOVAs for your enjoyment. Please take advantage of this club service and visit often to check out the new purchases. Suggestions for future library acquisitions are appreciated.

On the Internet

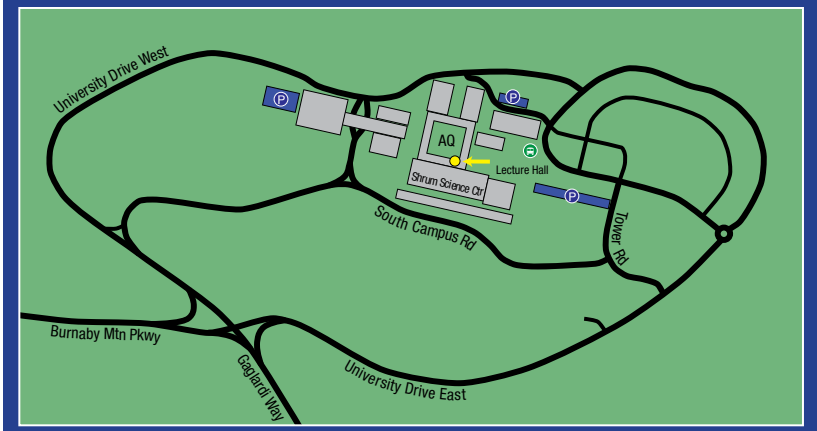
http://rasc-vancouver.com or
http://www.rasc.ca/vancouver
http://astronomy.meetup.com/131/
http://www.facebook.com/RASC.Van

@RASCVancouver

Mailing Address

RASC Vancouver Centre
PO Box 89608
9000 University High Street
Burnaby, B.C.
V5A 4Y0

Map to Meeting Site



Our Jan-Mar meetings are in room AQ3159, located near the southeast corner of the Academic Quadrangle as indicated by the arrow on the map.

Pay parking is available at several locations located around campus (indicated as "P" on the map).

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with a giant "butterfly net" to keep them out of the water. Their first attempt only missed by about 200 metres.

Fairings have returned to Earth before. They have washed up at North Carolina's Cape Hatteras Beach as well as South Carolina's Myrtle Beach. In both cases, SpaceX salvaged the fairings, however, they were badly damaged and probably not in re-usable condition. This might have sparked the idea of trying to recover them before their salt water dip.

Why I find this all so exciting is that SpaceX and Blue Horizons, as well as other private companies, are all trying to make space travel more economic. Another side benefit is that space launches will become more environmentally friendly as private companies waste less material and explore safer and less atmospheric-damaging fuels. These new technologies will also have a trickle-down effect to other more Earth-bound industries as well.

Apollo 8 flew around the Moon just before my 16th birthday in December 1968. I don't know quite what excited me more at the time: witnessing our first travel to another celestial body, or getting my driver's licence and no longer relying on a "20 window coup" to pick up a date. I do know at that time, I had no idea of all of the benefits that would come our way from our push into space. It was our first time we were able to view the whole of our planet from afar. It was humbling and a little frightening at the same time. The realization that we all share a finite planet that is just a speck of dust in the Universe is what instigated the

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The Falcon 9 Heavy launch on February 6th

Planet 9: Is it Out There?

by Don Duthie

"Pluto is no longer a planet!" Blasphemy! This cannot be true! Ever since Pluto's demotion from planetary status, the debate of a planet beyond Pluto has re-ignited. Recently more evidence has been complied to support the theory Planet 9 does exist. There has been a firestorm of activity since the discovery of two trans-Neptunian objects: Sedna and 2012 VP113 (Marcos 59). These objects have been discovered to have long, narrow, elliptical orbits and travel as far as 1,500 Astronomical Unit from the Sun. One AU is the distance of the Earth to the Sun or 150 million kilometres. Since Sedna and 2012 VP "closest approach to the Sun is 76 AU" [Trujillo 1], these are the perfect candidates to model the experiments that will lead us to Planet 9. Through extensive research and the efforts of citizen scientist groups, I believe Planet 9 will be discovered in our lifetime.

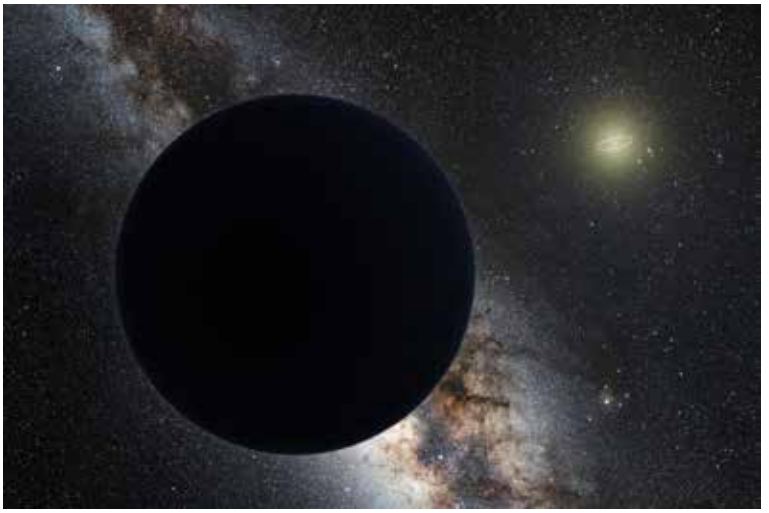

Image credit: Tom Ruen

Artist's impression of Planet 9 as an ice giant. Neptune's orbit is shown as a small ellipse around the Sun

In the recent debate of Planet 9, a controversial issue has been whether it even exists. On the one hand, some argue that there is enough evidence to support the theory that a large gas giant is influencing the objects in the Kuiper Belt [Batygin and Brown 3]. On the other hand, however, the

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Membership has its Privileges!

Are you tired of looking at the same objects again and again (planets, moon, etc.)? Is your telescope collecting dust because it's hard to locate deep sky objects? Would you like to bring your observing to a stellar level? Robert Conrad, our new observing director, revived the Vancouver RASC observing group and invites you to join by sending him an email at observing@rasc-vancouver.com. Some of the benefits of belonging to this group include:

- Hands on training on how to operate the sfu Trottier observatory
- Weekly observing sessions at the observatory or at dark sky locations
- One-one-one coaching on how to locate thousands of objects in the night sky
- Attend small interactive seminars delivered by Robert on a range of topics including failsafe star-hopping, charting challenging objects and understanding the motions of the cosmos
- Learn to make your telescope dance by locating objects such as asteroids, nova, and supernovae
- Spectroscopy and imaging training from Howard Trottier and an opportunity to collaborate on observatory research projects
- Updates on observable sky events happening during the week like asteroid/comet/deep sky conjunctions
- Access to observing guides and lists that Robert created that took hundreds of hours to create and will help with planning observing sessions
- Knowledge and expertise from other observing group members
- Learn how to quickly and efficiently find and star-hop to deep sky objects using a range of binoculars and telescopes

Upcoming Events

March
24 – Night Quest at Pacific Spirit Regional Park

May
12 – Astronomy Day at SFU

June
28 - July 2 – RASC General Assembly in Calgary

July
28 – Mars close approach at Science World

August
4 - 12 – Mt. Kobau Star Party

September
8 - 16 – Merritt Star Quest

December
13 – AGM

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others argue that there is a large debris belt past the Kuiper Belt with a large enough mass to warp the dwarf planets' orbits. In the words of Corey Shankman, this "is a temporary phenomenon that is due to a coincidence, and they expect this unusual alignment to disappear as more objects are detected." [Shankman 63]. One of the view's main proponents is that it is naturally occurring and that these objects are, for now, locked in an orbit together, but in a few thousand years they will move on [Shankman 63]. According to this view there is no Planet 9.

The next step is to understand what to look for in the research. Why does it matter that Planet 9 might look like Neptune? Knowing that Neptune was able to form farther out facilitates the idea that there is a boundary that will let ice condense. This is found in the four outer planets, where "The condensing of

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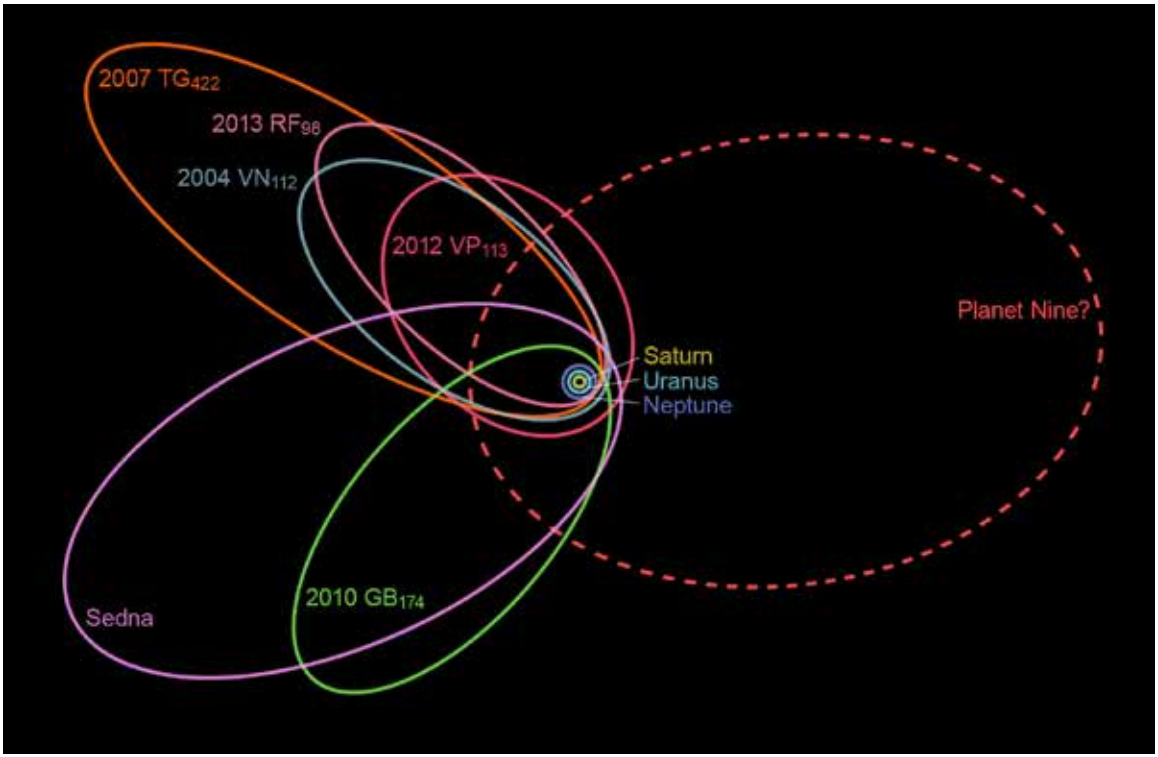

A hypothetical orbit for Planet 9

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ice, gathering of rock and methane released by the surrounding nebulas swelled these four planets." [Ridpath 195] Since the distance of Planet 9 is estimated to be twenty times farther from the Sun at temperatures close to −320° C, this finding leads to the possibility that Planet 9 could be of similar composition as Neptune. In addition, Planet 9's orbit is thought to be on a long, narrow, elliptical path that takes about 15,000 years to circle the Sun. The planet is thought to have ten times the mass and four times the diameter of Earth. This mean with the mass of the planet it easily clears its orbital path in the last 4.5 billion years. This is the definition of a planet and will certainly qualify once it's discovered. Furthermore, the efforts of citizen scientist groups will be foremost in searching through the mountains of material NASA has compiled. Specifically, The Zooniverse project, which was started in February 2017, has surveyed NASA's Wide-field Infrared Survey Explorer (WISE) images to search for Planet 9. It was launched to the public on March 28,2017 and in three days five million images were categorized by sixty thousand people.I was also one of the sixty thousand citizen scientists. The paper was published on May 24, 2017 in *The Astrophysical Journal Letters*. The paper announces the discovery of the first brown dwarf by a citizen scientist group

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VNC was set to show and control the iMac screen in the office. I set up the MacBook in the kitchen to keep warm and kept the office door closed.

On the front page is a picture taken near the beginning of the eclipse.

The cloud situation was variable throughout the whole eclipse. This meant that I had to experiment continuously with exposure times and ISO settings (the reason why I took so many images). But whenever I hit the correct exposure, I could suppress the clouds and bring out the actual image of the eclipsed moon. The image at right was taken under those conditions.

The partial phase. The bright part is highly overexposed in order to bring out the colour inside the Earth's shadow. This colour of the shaded part is caused by the Earth's atmosphere refracting the Sun's light into the shaded part. If you were on that (shaded) part of the Moon, the Sun would be covered by the Earth, but Earth would be surrounded by a red "sunset" ring.

The next page shows an image of the Moon at mid-eclipse through a fortuitous, short "clear" hole in the clouds.

The cloud situation got worse after the eclipse total phase was finished. The Moon was also much lower in the west. Here's another

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through a "cloudhole" shot. It was the last clear one (right).

The final image below. A thick bank of clouds rolled in and covered the Moon completely. The variable clouds earlier fortunately occurred in the right time frame to see most of the eclipse. ✸

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modern environmental movement. Earth Day was born as a direct result. The technological advancements we almost take for granted today include the miniaturization of electronics. The need to put computers onto spacecraft was an important driver of miniaturization. I am typing this message right now using one of the results of this ongoing process.

Looking forward, I think we are now living in an even more exciting age than the sixties. I envy the young people today that can dream of careers in astronomy, planetary geology, rocketry, as well as the trades that will support future space industries.

As the cost of space launches decrease, more science will move into space. Astronomy, for one, will find ways of using the newly discovered gravity waves to probe beyond the Cosmic Background Radiation boundary and explore the earliest origins of our Universe. Industry will find ways to exploit the untapped resources of our solar system to relieve the reliance on our own home world. I foresee a future where all sorts of talents will be needed in space and you will no longer have to start out as a fighter pilot to find your way there. ✸

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[Kushner 1]. Even though Planet 9 hasn't been discovered as of this time. The "proof-of-concept" did work. Taking archival images and releasing them to the public to categorize is a very efficient way to discover new objects using citizen scientist.

Ultimately, the debate of Planet 9 is still a little controversial. The public is skeptical and not everyone will be so easily convince until there is proof. I agree. We should question every result. Encourage debate on the evidence and don't get attached to one idea [Sagan 201-203]. We have to be open to other theories but also follow the bread crumbs. There is enough evidence now that governments are taking this search seriously. According to a Canadian Government announcement, "They have found out that something is perturbing the orbits of some of the objects in the Kuiper Belt. So, more research is being done in California's NASA Jet Propulsion Laboratory" [Tapping n.pag.]. With the continue support form NASA, The European Space Agency and The Canadian Space Agency, Planet 9 is on the verge of being discovered. This is an exciting time in astronomy. ✸

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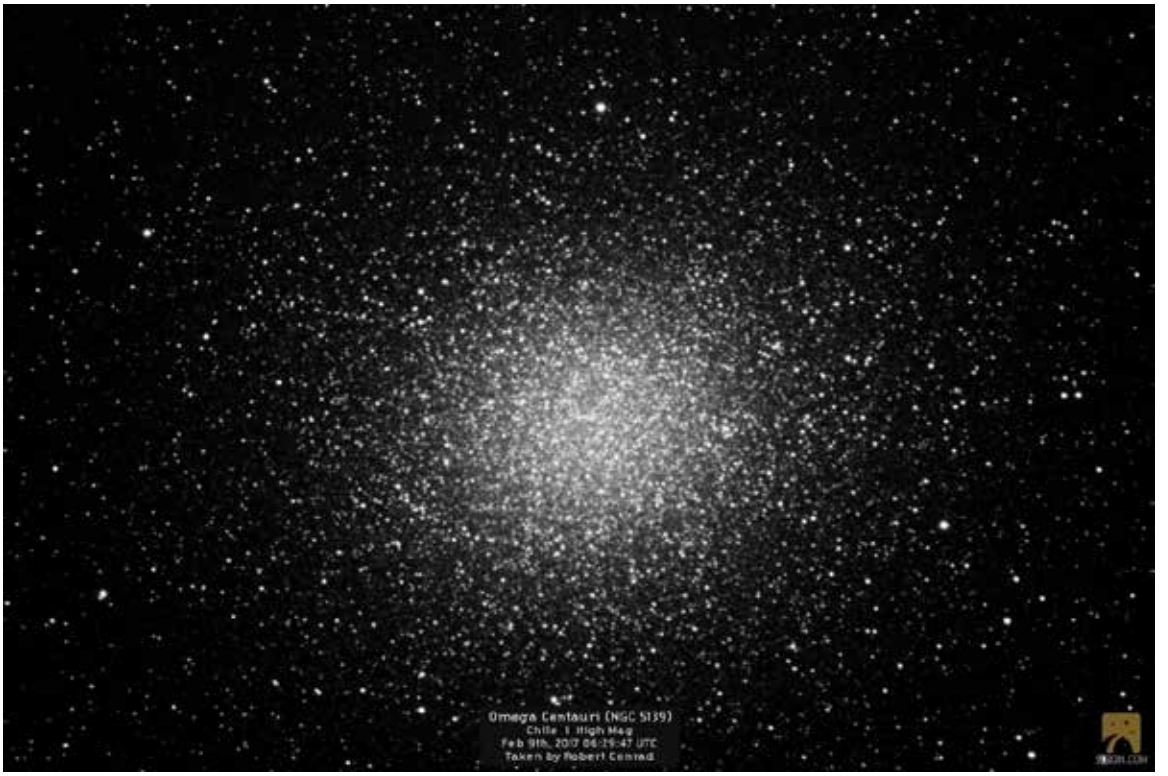
Members' Gallery



Omega Centauri (NGC 5139)
by Robert Conrad
Taken with the remote-controlled SLOOH telescope in the Canary Islands on Feb. 9 of last year.

Running Man nebula (NGC 1977)
by Robert Conrad
Taken with the remote-controlled SLOOH telescope in the Canary Islands on Mar. 1 of last year.

The Lagoon nebula (M8)

by J. Karl Miller

Taken with the remote-controlled SLOOH telescope in the Canary Islands. This nebula is a Hydrogen interstellar cloud whose dimensions are about 55 x 20 light years and which is about 4000 light years distant. It contains a star-forming region (the bright area) and can be seen with binoculars. The bright stars to the left are an open star cluster in the foreground.

Under a dark sky, the nebula is an impressive sight, but you will not see the colours shown in the image. The human eye is not capable of showing colours at faint levels of light.

Gibbous Moon by Robert Conrad
Taken on February 25th from my balcony in New Westminster just pointing the iPhone at my telescope eyepiece.