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1. Greetings!

Welcome to the Cowichan Valley StarFinders Astronomy Club's "Clear Skies" monthly newsletter.

Here we are finally "summer" on the "wet coast" and I hope everyone is taking advantage of the warm evenings and doing some stargazing. Planning is shaping up for our Island Star Party (Aug 26-28). The schedule of events has been posted on the website as well as the posters for this year. Please help advertize by printing a couple of posters to put on your car or around your neighbourhood. Some posters are being made and will be available to members, so check your email and try and help promote our once a year "big" event.

The annual Perseid meteor shower peaks late tonight (Aug 12), but there's a full Moon which will flood the sky with light and will hide all but the brightest meteors.

Check out the latest discovery from our Canadian scientists "Earth has Asteroid Companion". Like the moon, the Trojan Asteroid known as 2010 TK7 is under the control of Earth's gravity and has been orbiting stably with the Earth for at least 10,000 years.

Many thanks to this month's contributors Moe R and Bryon T.

By Freda Eckstein

"Astronomers, like burglars and jazz musicians, operate best at night"- Miles Kington

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2. Socials

Socials are held on the 4th Wednesday of each month (except for July and August) at the home of Bryon and Freda.

Click on the [Map](#) or follow these directions:

Island Hwy, Mill Bay

Turn on Frayne Rd towards ocean (Serious Coffee is on the corner)

Turn right on Huckleberry Rd

3rd house on the left across from Springbank road and Mail boxes.

Look for the STAR sign

Please park on Huckleberry or Springbank Rd's.

Call Brian 743-6633 if you need directions

Our next Social will be held at **7:30** on **WEDNESDAY September 28th**

Feature: "ISP Show and Tell" viewing of ISP Photos. Come on out and show off your pictures of the event or your astro photos.

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Social Highlights

The Annual General Meeting of the Cowichan Valley Starfinders was held on June 22, 2011 at the home of Moe Raven. All members of the CVSF Board of Directors agreed to let their names stand for the coming year.

Therefore, your Directors for 2011-2012 are as follows:

President – Paul Randall

Vice-President – Brian Robillard

Treasurer – Ed Nicholas

Public Outreach Officer – Doug Dulmage

Secretary – Nancy Kirshfelt

Newsletter Editors – Bryon Thompson and Freda Eckstein

Webmaster – Brian Robillard

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3. Upcoming Events



Every Wednesday 9:00 pm – 10:00 pm Astronomy Open House at University of Victoria, 5th floor Bob Wright Centre

You say you do not know a red dwarf from a black Hole? A giant star from a globular cluster? Well here's your chance to discover everything you've wanted to know about the sky.

Rain or Shine, Admission Free, Parking \$2.00

Every Saturdays & Wednesdays* 1:00-1:30 PM, CHLY 101.7 FM

Not Rocket Science (NRS) is a thirty minute weekly radio show about the science of everything and everything science. Dial them up or listen to past podcasts at

<http://chly.dailysplice.com/notrocketscience/>

CVSF Star Party:

Aug 26 - Aug 28, 2011 CVSF Starparty at Bright Angel Park, Cowichan Station B.C.

Located in "the Hub of the Universe" where overnight camping is allowed. Daytime activities include solar viewing, music, lectures and guided nature walks. Evening lectures and great views abound.

More Info: <http://www.starfinders.ca/starparty10.htm>

Other Star Parties in B.C.:

Aug 27 – Sept 3 Summer Star Quest 2011, Merritt B.C.

If you're into camping and doing "all nighter's" under a canopy of stars, observing deep sky objects and the occasional planet then this event is right up your alley! More info:

<http://www.merittastronomical.com/index.html>

October 1, 2011. KAS Star Party. Stake Lake Observatory. Kamloops Astronomical Society. More Info:

<http://kamloopsastronomy.ca/>

NASA Launches credit NASA.Com:

Date: Aug. 5

Mission: Juno

Launch Vehicle: Atlas V

Launch Site: Cape Canaveral Air Force Station, Fla.

Launch Time: 11:34 a.m. EDT

Description: The solar-powered Juno spacecraft is to orbit Jupiter's poles 33 times to find out more about the gas giant's origins, structure, atmosphere and magnetosphere.

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4. This Month In History

Courtesy of: Windows2universe.org

August 1

1818 - Maria Mitchell's birthday

Maria Mitchell was an American astronomer who lived from 1818-1889. She was the first female professor of astronomy in the United States. She discovered the comet of 1847. In 1848, she was the first woman appointed to the Academy of Arts and Sciences.

August 6

1945 - First atomic bomb dropped

During World War II, the first atomic bomb was dropped by the U.S. on the Japanese city of Hiroshima.

August 10

1945 - Death of Robert Goddard

Robert Goddard was an American physicist who lived between 1882-1945. He was a pioneer of modern rocketry who discovered that liquid fuel is more efficient than solid fuel.

August 17

1877 - Discovery of Phobos and Deimos

American astronomer Asaph Hall discovered Phobos and Deimos, the moons of Mars.

August 19

1994 - Death of Linus Pauling

Linus Pauling was an American chemist who lived between 1901-1994. He was the first person to apply quantum mechanics to chemistry, and made great progress in the field of molecular biology.

August 25

1609 - Galileo demonstrates his first telescope to Venetian lawmakers.

Galileo was the first person to use a telescope to look at the heavens. He discovered sunspots, and craters and peaks in Earth's moon. The telescope also allowed Galileo to confirm the work of Copernicus in that the planets circle the Sun.

1822 - Death of William Herschel

William Herschel was born in Germany and lived in England as he worked as an astronomer. He lived between 1738-1822. He built high magnification telescopes that let him observe the heavens with greater detail. Herschel discovered the planet Uranus and advanced our understanding of nebulae.

August 27

1883 - Krakatoa island destroyed by volcanic explosion

One of the most powerful volcanic explosions in the history of the world occurred at Krakatoa island. In May, 1883, a series of eruptions commenced which continued until August 27, 1883, when a cataclysmic explosion blew the island apart.

1962 - Mariner 2 launch

Mariner 2 was the first interplanetary spacecraft, successfully reaching Venus in December 1962.

August 30

1871 - Birthday of Ernest Rutherford

Ernest Rutherford was a New Zealand-born physicist who lived between 1871-1937. He is considered the father of nuclear physics because of his discoveries on atomic structure.

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5. Cool Pics/Videos

Want to show off your latest pics? Well here's your chance; email the editor at [My Cool Pics](#) and we will try to post them in the next edition of "Clear Skies".

Check out the Star Walk Facebook Contest: Do you love astronomy? Have an iPhone and/or iPad? Then you should definitely check out the Star Walk app. The folks at Star Walk are holding a [facebook contest](#) where you can win the app for free,

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6. Featured Articles

Articles

[RETURN TO CATEGORIES](#)

1. [Exoplanet Aurora: An Out of this World Sight](#)
2. [Hubble Discovers Pluto's 4th](#)

Exoplanet Aurora: An Out-of-This-World Sight— July 22/11 Credit Harvard-Smithsonian Center for Astrophysics, Cambridge, Massachusetts

Earth's aurorae, or northern and southern lights, provide a dazzling light show to people living in the polar regions. Shimmering curtains of green and red undulate across the sky like a living thing. New research shows that aurorae on distant "hot Jupiters" could be 100 to 1,000 times brighter than earthly aurorae. They also would ripple from equator to poles, due to the planet's proximity to any stellar eruptions,

Moon

3. [Earth has Asteroid Companion](#)
4. [Looking for the Origins of Life in BC Lake](#)
5. [VISTA finds 96 Star Clusters Hidden Behind Dust](#)

treating the entire planet to an otherworldly spectacle. "I'd love to get a reservation on a tour to see these aurorae!" said Ofer Cohen from the Harvard-Smithsonian Center for Astrophysics (CfA) in Cambridge, Massachusetts.

Earth's aurorae are created when energetic particles from the Sun slam into our planet's magnetic field. The field guides solar particles toward the poles, where they smash into Earth's atmosphere, causing air molecules to glow like a neon sign. The same process can occur on planets orbiting distant stars, known as exoplanets.

Particularly strong aurorae result when Earth is hit by a coronal mass ejection (CME) — a gigantic blast that sends billions of tons of solar plasma (electrically charged hot gas) into the solar system. A CME can disrupt Earth's magnetosphere — the bubble of space protected by Earth's magnetic field — causing a geomagnetic storm. In 1989, a CME hit Earth with such force that the resulting geomagnetic storm blacked out huge regions of Quebec, Canada.

Cohen and his colleagues used computer models to study what would happen if a gas giant in a close orbit, just a few million miles from its star, were hit by a stellar eruption. He wanted to learn the effect on the exoplanet's atmosphere and surrounding magnetosphere. The alien gas giant would be subjected to extreme forces. In our solar system, a CME spreads out as it travels through space, so it's more diffuse once it reaches us. A hot Jupiter would feel a stronger and more focused blast, like the difference between being 100 miles (160 kilometers) from an erupting volcano or 1 mile (1.6 km) away. "The impact to the exoplanet would be completely different than what we see in our solar system and much more violent," said Vinay Kashyap from CfA.

In the model, a CME hits the hot Jupiter and weakens its magnetic shield, and then CME particles reach the gas giant's atmosphere. Its aurora lights up in a ring around the equator 100 to 1,000 times more energetic than earthly aurorae. Over the course of about 6 hours, the aurora then ripples up and down toward the planet's north and south poles before gradually fading away.

Despite the extreme forces involved, the exoplanet's magnetic field shields its atmosphere from erosion.

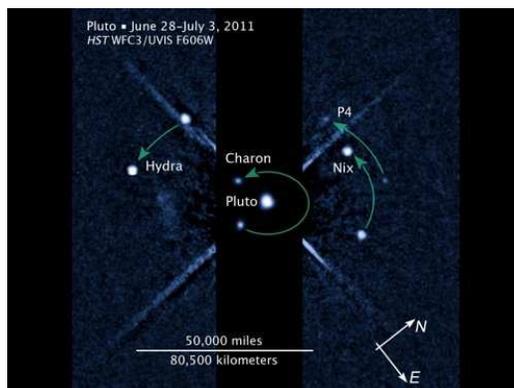
"Our calculations show how well the planet's protective mechanism works," said Cohen. "Even a planet with a magnetic field much weaker than Jupiter's would stay relatively safe." This work has important implications for the habitability of rocky worlds orbiting distant stars. Because red dwarf stars are the most common stars in our galaxy, astronomers have suggested focusing on them in the search for earthlike worlds.

However, since a red dwarf is cooler than our Sun, a rocky planet would have to orbit very close to the star to be warm enough for liquid water. There, it would be subjected to the sort of violent stellar eruptions Cohen and his colleagues studied. Their future work will examine whether rocky worlds could shield themselves from such eruptions.

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Hubble Discovers Pluto's Fourth Moon—July 22/11 *credit About.com*

For all the controversy that swirls around the tiny dwarf planet called Pluto, it is surprising to note that most people don't even realize that it has a moon. Well, it actually has four for that matter (that we know of).



Some are familiar with Charon, the companion to Pluto that often gets brought into the is Pluto a planet discussion. But scientists have been aware of two others, Nix and Hydra since 2005 when Hubble previously turned its gaze to the icy world.

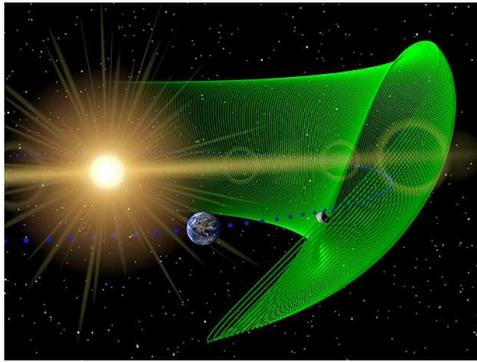
The fourth, and most recent, of Pluto's moons to be discovered may prove to be one of Hubble's most astonishing feats to date. This is because Hubble spotted P4, as it is temporarily known until a more permanent name is agreed upon, at a distance of some 3 billion miles from Earth.

On its own, this doesn't sound like any great achievement as Hubble has detected objects much, much further away than that. Rather, the interesting bit is that P4 is only between 8 and 21 miles in diameter. That is an incredibly small object to see at such a great distance.

Hubble zeroed in on Pluto as a preparatory measure for the nearing New Horizons fly by. The NASA mission is set to pass through the Pluto system in 2015, and the more information that is known ahead of time the more researchers can plan their observations.

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Earth has Asteroid Companion—July 28/11 *credit Astronomy and Space*



The moon isn't the only hunk of space rock that has been travelling around the sun with the Earth for ages. Canadian scientists have discovered that the Earth is also accompanied by a "Trojan" companion — an asteroid that travels a constant distance ahead of it at all times, sharing nearly the same orbit around the sun.

Similar objects have been found travelling with other planets in our solar system, including Mars, Jupiter and Neptune.

Trojan asteroids

Trojan asteroids were first predicted to exist in 1772 by Italian-French astronomer and mathematician Joseph-Louis Lagrange. He recognized that there are certain points where the gravitational pull of two objects such as the Earth and the sun on a third object such as an asteroid balance each other off, allowing the object to remain, on average, at a fixed distance from the other two masses. Those points are now called Lagrange points, and the two where Trojans can be found are referred to as Trojan points. Trojan asteroids aren't necessarily found precisely at the Trojan point, but may instead orbit them so that the Trojan point represents their average position. The first Trojan was observed orbiting with Jupiter in 1906.

Objects in the solar system are traditionally given names from classical Roman and Greek mythology, and the first Trojan asteroid was named Achilles, said Martin Connors. Because of his role in the Trojan war, similar asteroids have been called Trojans ever since. "In a way, these are sort of like secondary moons," said Martin Connors, the Alberta scientist who led the discovery published in Thursday's issue of *Nature*.

Like the moon, the asteroid known as 2010 TK7 is under the control of Earth's gravity and has been orbiting stably with the Earth for at least 10,000 years. However, Trojans are not satellites — unlike the moon, the Trojan asteroid does not orbit the Earth. Viewed from the Earth, the asteroid sits 60 degrees from the sun.

"You would think that the gravity of the planet would just like to pull the asteroid in," said Connors. "But when it does do that, it moves closer to the sun, and then the sun's gravity makes it go faster, and it pulls away from the planet again."

Gravity balancing act

Along the Earth's orbit, it is only when an object such as the asteroid sits at one of two Trojan points at a 60-degree angle from the Earth that the Earth's and the sun's gravity balance each other off, allowing the object to remain nearly stationary relative to the Earth.

2010 TK7 is about 300 metres across, making it rather large compared to other nearby asteroids. According to NASA, it is now about 80 million kilometres from Earth. By comparison, the moon is on average 384,000 km away.

Connors, who holds a Canada Research Chair in space science at Athabasca University, has been searching the skies for nearby Trojans for about 15 years. It isn't easy because the area being searched is 60 degrees, or very close to the sun when viewed from Earth. That means the objects are only visible for a short time just before sunrise or just after sunset. Connors combed through data collected by researchers at the University of California in Los Angeles from NASA's WISE (wide-field infrared survey explorer) telescope. It orbits the Earth and detects asteroids by scanning for the infrared radiation they give off after warming up in the sun. That radiation doesn't make it through the atmosphere, so it is invisible from Earth. After finding two asteroids that looked like they could be Trojans, Connors sent the

data to Paul Wiegert at the University of Western Ontario, who used computer modelling to see how similar objects should behave. That made it clear that the researchers would need more observations of the asteroid to confirm it was a Trojan. They called upon Christian Veillet, executive director of the Canada-France-Hawaii Telescope in Kamuela, Hawaii, to use the telescope to scrutinize the asteroid's orbit for six days this past April. The observations confirmed that the asteroid is a Trojan.

Connors said the discovery of one Trojan orbiting with the Earth means there are likely others. Such nearby asteroids wouldn't require much energy to visit with a space probe, since they are so close and have a similar orbit to earth, he said. However, 2010 TK7 itself isn't a good candidate for such a visit because its orbit is tilted relative to the Earth's.

Trojan asteroids are of interest to scientists because they may hold material leftover from the formation of the solar system, Connors said. While meteorites also contain such material, they typically have wandered long distances and scientists can never be quite sure where they came from. Trojan asteroids likely have remained close to the Earth for a long time, and the material they contain is more likely to originate near the Earth.

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Looking for the Origins of Life in a B.C. Lake—July 30 /11 credit CBCNews

A team of Canadian and American scientists is exploring two remote B.C. lakes, employing deepwater submersibles to study the living processes behind certain ancient rock structures. They hope these might shed light on the earliest forms of microbe-based life, both here on Earth and in outer space. Sponsored by both NASA and the Canadian Space Agency, the now seven-year-old Pavilion Lake Research Project expanded from its eponymous origins in July to nearby Kelly Lake, by the town of Clinton, B.C.

The researchers are examining the origins of a specific and very ancient sedimentary formation formed by algae and a certain type of bacteria, in the process fine-tuning exploratory techniques and clues that they feel might be useful on future space missions. "There are these rocks in the lake called microbialites that are built in some way by the bacteria living on the surface of the rock structure," explains principal investigator Darlene Lim, a limnologist, or lake scientist, at NASA's Ames Research Centre in California.

The microbialites of Pavilion Lake

Microbialites are carbonate rock structures that are believed to have been formed with the help of primitive micro-organisms such as bacteria. While they were common 2.5 billion to 540 million years ago, they are rarely found today in freshwater lakes, which made their discovery in Pavilion Lake in the 1990s of great interest to scientists.

The Pavilion Lake microbialites are believed to be no more than about 10,000 years old. Scientists also believe that if life is found beyond Earth, it will likely be microbial and therefore the study of microbialite formations here could help identify signs of life elsewhere in the universe.

In fact, a Martian meteorite discovered in Antarctica in 1984 was recently confirmed to contain crystals that look similar to some created by bacteria on Earth. "What we're trying to figure out is what the role of these microbes is in building up these rocks, both in a present-day sense and in a past sense." From about 2.5 billion years ago until about 500 million years ago, microbialites were very common, and they remain among the earliest remnants of life on the planet. As it happens, Pavilion Lake and Kelly Lake have an unusual amount and diversity of microbialites, in shapes ranging from artichoke-like to columns.

By diving down to study the structures, whether in scuba gear or in a one-person submersible, researchers are hoping to uncover the chemical signatures that might be left by these microorganisms and to compare them with what they might find someday on distant asteroids and planets. To this end, the microbial ecologists and geochemists from the Pavilion Lake project have been working alongside astronauts, including NASA's Mike Gernhardt and Canada's Chris Hadfield, to study the unique ecosystems.

Surprising discoveries

For her part, Lim is a veteran of what NASA refers to as its space exploration "analogs," having spent time as well in a Mars simulation base in Canada's High Arctic, among other sites.

The Pavilion Lake Research Project, though, is somewhat unique among these simulation programs in

that it combines the study of exploratory technique with the collection of real data that a veritable village of researchers depends upon.

She, in fact, was one of the scientists who piloted the DeepWorker subs below the surface this year and she can tell you that, while they are sisters, Kelly Lake is very different from Pavilion. "Pavilion is much deeper and much clearer, and the water quality is much higher."



Principal investigator Darlene Lim prepares to go on a dive with the help of researcher Jeff Rozon. The Nuytco submersibles can stay underwater for up to 12 hours.

Piloting through the much murkier green of Kelly Lake, on the other hand, made it difficult to make observations without moving in very close to the shore.

"When we were at depths of about 120 feet of water, it was difficult to see even a foot in front of you," she says. "So you had to move very slowly. But it was extremely productive, and it was exhilarating when you came across something you weren't expecting."

Both lakes are scientifically unusual, says Lim, because they're not extreme in any sense. Most places where

microbialites are found today are either very salty or very alkaline. Indeed, they are among the most inhospitable places on the planet where few other organisms survive. As such, understanding the environmental conditions behind the growth of microbialites in these two lakes paints a better picture of early eras on Earth when these formations were much more common, Lim says.

Lessons for space

Both the space agencies supporting the project are also interested in any lessons they might learn about the logistics of future space missions. Despite being underwater, many of the technologies and research protocols surrounding this project are similar to what will be needed in other extreme environments, like space, says Lim. "All of these activities, whether they are with submersibles or scuba divers, have analogies to how we'll operate with humans on places like the moon, or Mars, or near-Earth objects in the future." For example, she says, "when we send humans to near-Earth objects or Mars, communications will be delayed between the time that you send them and the time that you receive them, because of the distance that it has to travel."

At Pavilion Lake, they've discovered that allowing that lag between sub operators and teams talking to them on land seemed to allow some scientists to work better because they weren't being interrupted. She stresses, however, that the project was not examining more high-pressure emergency or technical situations. There is currently much uncertainty in the U.S. about space exploration, particularly now that the shuttle program has ended.

But NASA is at least preparing the groundwork for manned missions further afield where the Pavilion Lake Research Project's work may come in handy. The Orion spacecraft, currently undergoing testing, is designed for deep space missions to Mars or nearby asteroids sometime around 2025 or 2030. "I think I'll be a little old by the time we get ourselves in gear to go to near-Earth objects, but my son and daughter will be perfect for it," Lim laughs. She said she had mixed emotions about the end of the shuttle program this summer, "a bit of nostalgia and melancholy, but also a whole lot of excitement looking forward.

"We have no other option but to look to the future."

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VISTA Finds 96 Star Clusters Hidden Behind Dust—Aug 3/11 credit ESO



Using data from the VISTA infrared survey telescope at ESO's Paranal Observatory, an international team of astronomers has discovered 96 new open star clusters hidden by the dust in the Milky Way. These tiny and faint objects were invisible to previous surveys, but they could not escape the sensitive infrared detectors of the world's largest survey telescope, which can peer through the dust. This is the first time so many faint and small clusters have been found at once.

This result comes just one year after the start of the VISTA Variables in the Via Lactea programme (VVV) [1], one of the six public surveys on the new telescope. The results will appear in the journal *Astronomy & Astrophysics*.

"This discovery highlights the potential of VISTA and the VVV survey for finding star clusters, especially those hiding in dusty star-forming regions in the Milky Way's disc. VVV goes much deeper than other surveys," says Jura Borissova, lead author of the study. The majority of stars with more than half of the mass of our Sun form in groups, called open clusters. These clusters are the building blocks of galaxies and vital for the formation and evolution of galaxies such as our own. However, stellar clusters form in very dusty regions that diffuse and absorb most of the visible light that the young stars emit, making them invisible to most sky surveys, but not to the 4.1-m infrared VISTA telescope.

"In order to trace the youngest star cluster formation we concentrated our search towards known star-forming areas. In regions that looked empty in previous visible-light surveys, the sensitive VISTA infrared detectors uncovered many new objects," adds Dante Minniti, lead scientist of the VVV survey. By using carefully tuned computer software, the team was able to remove the foreground stars appearing in front of each cluster in order to count the genuine cluster members. Afterwards, they made visual inspections of the images to measure the cluster sizes, and for the more populous clusters they made other measurements such as distance, age, and the amount of reddening of their starlight caused by interstellar dust between them and us.

"We found that most of the clusters are very small and only have about 10–20 stars. Compared to typical open clusters, these are very faint and compact objects — the dust in front of these clusters makes them appear 10 000 to 100 million times fainter in visible light. It's no wonder they were hidden," explains Radostin Kurtev, another member of the team.

Since antiquity only 2500 open clusters have been found in the Milky Way, but astronomers estimate there might be as many as 30 000 still hiding behind the dust and gas. While bright and large open clusters are easily spotted, this is the first time that so many faint and small clusters have been found at once.

Furthermore, these new 96 open clusters could be only the tip of the iceberg. "We've just started to use more sophisticated automatic software to search for less concentrated and older clusters. I am confident that many more are coming soon," adds Borissova.

Notes

[1] Since 2010, the VISTA Variables in the Via Lactea programme (VVV) has been scanning the central parts of the Milky Way and the southern plane of the galactic disc in infrared light. This program was granted a total of 1929 hours of observing time over a five year period. Via Lactea is the Latin name for the Milky Way.

7. Buy and Sell

Here's your chance to clean out the closet and find a home for your slightly used treasures. Post your buy and sell items by emailing the [Editor](#) with your details.

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8. Ask an Expert

Have you been thumbing through the Astronomy or Sky and Telescope magazine and have some questions on the latest and greatest in astronomy gear? Or maybe you're narrowing down your search for just the right telescope and want to know the difference between Dobsonians, Schmidt-Cassegrains, Reflector and Refractors. Well wonder no more, email [Brian Robilliard](#) our resident expert to get the "inside scoop" on what's hot or not in astronomy gear.

Are you new to astronomy? Want to know the how to find objects in the sky? Or just wondering what that bright object in the evening sky is? Well wonder no more; email [Bryon Thompson](#) our Editor and master of Astronomy 101 basics.

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9. Kids Korner

For the younger astronomers. We want your input on what you would like to see happening at the club. Tell us a bit about yourself and why you love astronomy. Email the [Editor](#) with your submissions. For the older folks, if you have any ideas that might spark the interest of a young upcoming astronomer, please send your submissions to the editor.



See if you can Find 10 Differences in our Aliens:

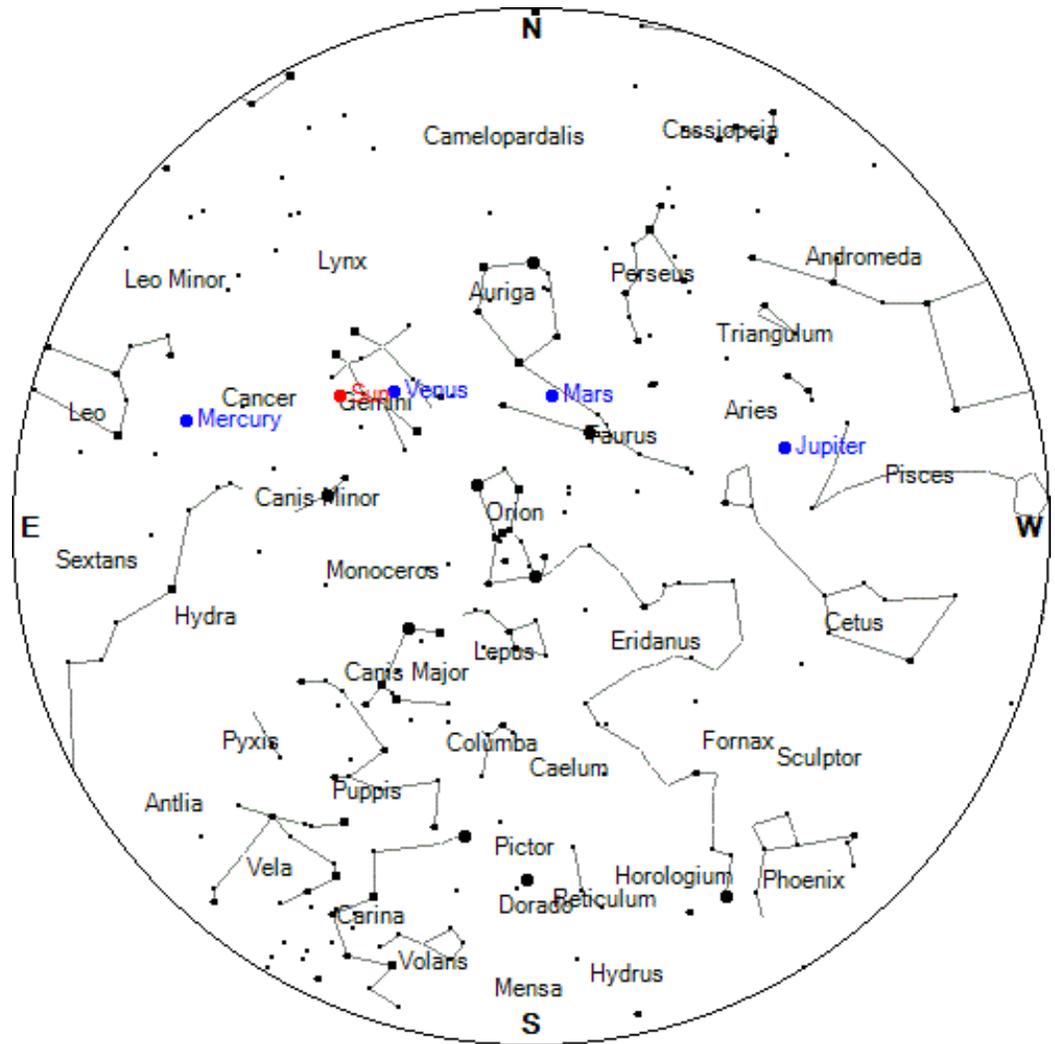
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10. The Sky This Month

By Bryon Thompson

Observing Site: Duncan, **48.783°N, 123.700°W**

Sky Chart —Here's your mid-August midnight sky chart. In order to use the sky chart properly remember the centre of the chart is the sky directly above your head (or the Zenith). Turn the chart so that the direction you are facing is at the bottom of the chart (or pointed toward your toes). The star field directly in front of you will be between the bottom of the chart and the centre.



SkyChart Courtesy of Heavens-Above

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