Newsletter of the Pomona Valley Amateur Astronomers

I believe that if one always looked at the skies, one would end up with wings. *Gustave Flaubert*

Volume 36 Number 12 ***nightwatch*** **December 2016**

President's Message

It's pretty quiet this time of year, at least at Casa Wedel. I'll admit it; I'm a wuss when it comes to stargazing in the cold.

Fortunately there is a lot to see when I do venture out. The winter constellations are rising earlier and earlier, bringing a visual feast of bright stars and star clusters. Venus is bright in the western sky right after sunset, and Mars is still out there, too, although only 6 arcseconds across now. Jupiter rises in the early morning, and Saturn is lost in the sunset. Uranus and Neptune are still high in the southern sky after dark.

Farther afield, it's an interesting time in the solar system. With the arrival of the European Space Agency's ExoMars Trace Gas Orbiter in October, the number of active missions on and around the red planet stands at eight. JUNO is sending back a steady stream of new data from Jupiter, and Cassini is performing a series of ring-grazing orbits as it enters its last 9 months of service. Cassini will be crashed into Saturn next September, after more than 13 years of active duty around the ringed planet.

We have an outreach this week, from 5:00-6:30 PM Thursday night, at Oakmont Public School, 120 West Green Street, in Claremont. The forecast calls for clear skies, so hopefully we'll get a good turnout.

This Saturday is the last club event of the year: the annual holiday party! Join us at 7:00 at the IHOP at 80 North Euclid Avenue in Upland. We'll have our usual free raffle and everyone will go home with something, so come on out and celebrate with us.

Matt Wedel

Club Events Calendar

Dec 10, 2016 Xmas Party

Jan 4, 2017 Board Meeting
Jan 13, 2017 General Meeting
Jan 28, 2017 Star Party – Salton Sea, Mecca Beach

Feb 1, 2017 Board Meeting
Feb 10, 2017 General Meeting
Feb 25, 2017 Star Party

March 1, 2017 Board Meeting
March 10, 2017 General Meeting
March 25, 2017 Star Party

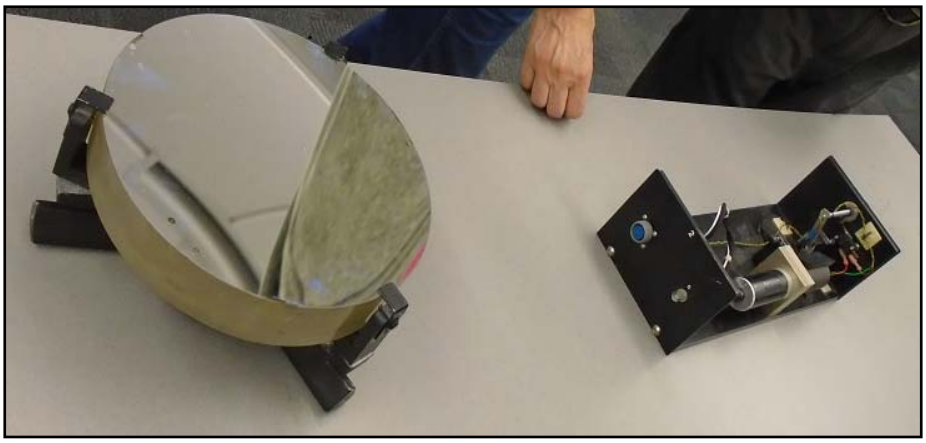
Mar 30, 2017 Board Meeting
Apr 7, 2017 General Meeting
Apr 22, 2017 Star Party

May 3, 2017 Board Meeting
May 12, 2017 General Meeting
May 25 - 29, Joint RTMC

May 31, 2017 Board Meeting
June 9, 2017 General Meeting
June 24, 2017 Star Party

PVAA General Meeting 11/18/16

The meeting was opened by PVAA President Mathew Wedel, with a few announcements, followed immediately by Mike Ferrari – an 8th grade math and science teacher giving a little show and tell on pieces of a telescope he bought and an electronic box that wasn't quite sure what it did.

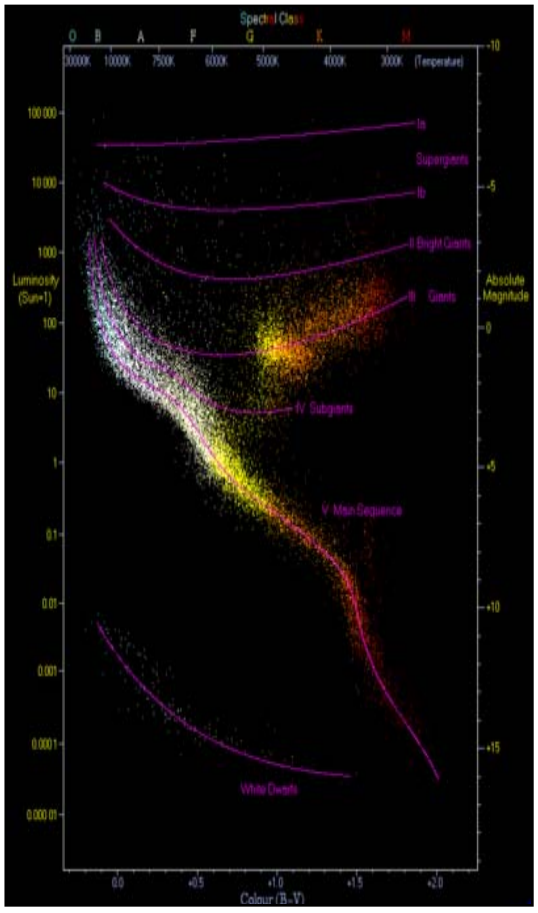


Tim Thompson of JPL (Retired) and the Los Angeles Astronomical Society gave the main presentation on Globular Clusters. He mainly stayed with the globular clusters circling the Milky Way Galaxy. He showed the difference between an open cluster and a globular cluster. The most famous globular cluster in the northern hemisphere is M13, also known as the Great Globular Cluster in Hercules, as it big and bright in a telescope, and it is in the constellation of Hercules – making it a summertime favorite.

As you can see, a globular Cluster is a"ball" of stars that can be 10,000 stars to over a million stars. The local globular clusters all orbit the Milky Way, are generally much older than the stars in the arms and edges of the galaxy, and do not have much new star formation. Most globular clusters are on the order of 11 billion or more years old, while our sun is less than 5 billion years old.

Tim brought up the work of Henry Norris Russell, Ejnar Hertzsprung and Cecilia Payne. -Cecilia discovered that stars were made up of mostly hydrogen and helium. When she reported this, she was ridiculed and Henry Russell dissuaded her from presenting her findings. Four years later Henry, using a different method, came up with the same results. He published his paper, giving a brief mention of Cecilia.

Ejnar Hertzsprung and Russell came up with the Hertzsprung-Russell Diagram of main sequence stars:



M13 Hercules Globular Cluster

M45 Pleiades Open Cluster

Tim then brought up the Spitzer Space Telescope and the GLIMPSE project: Galactic Legacy Infrared Mid-Plane Survey Extraordinaire. It surveyed the inner Milky Way using 4 different wavelengths in approximately 444,000 images. This was one of his last projects working at JPL.

Gary Thompson

The northern branch of the PVAA visits the southern.
Claire Stover with Ray and Irene Magdziarz

PVAA Officers and Board

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What's Up? - Animals In Space

What were the first life forms to go into space orbits? Not NASA Astronauts or Soviet Cosmonauts, but animals. Animals that didn't have a choice about going into outer space.

Before humans went into space there were ideas that they might not be able to survive long periods of weightlessness. So Russia and America experimented on monkeys, dogs, and a variety of other life forms.

The first earth being to give birth in space was a Russian cockroach (named Nadezhda). She produced 33 babies. Roaches are tough and will reproduce anywhere.

In fact high altitude animal experiments also have an long history going back to 1783 when France's Montgolfier brothers sent a sheep, a rooster and a duck up in a hot air balloon. They got down safely.

The first being to truly go into outer space orbit was the Russian dog Laika (Barker) in 1957 on Sputnik 2. Dog lovers prayed for him. It didn't help. After orbiting the Earth a few times his cabin overheated and he died only to then burn up falling back to earth. Early Soviet rockets sent thirteen dogs into space. Only eight return alive. Questions of animal cruelty were raised. The launches were nicknamed "Muttniks" by the Americans. It was felt that failure to return creatures alive was a tragic project failure. Humans would have to come back alive.

So in 1960 the Soviets sent up two more dogs (Belka and Strelka) along with forty mice, two rats and a rabbit. After eighteen orbits all were returned alive for examination. Strelka later had healthy puppies one of which was given to President Kennedy. All of these dogs were "tough strays" taken off the street. The French got into the Space Race by launching stray cats into space (with names like Felicette). They were pictured with electrodes implanted in their heads. They all died which brought about demands to halt French stray cat launching. In 1964 the Chinese tried mice, rats and dogs. Even Argentina sent up a rat called Belisano. All these animals suffered while giving biological information in their unwilling martyrdom. It all proved weightlessness wasn't that bad.

In 1968 the Russian's Zond 5 carried turtles, flies and mealworms all the way into orbit around the Moon. They were recovered though the turtles lost 15% of body weight. They probably spent the time fearfully cowering in their shells not feeling much like having a snack. This was becoming a Space Race between many countries.

Eventually many more animals were brought back alive. In 1966 two Russian dogs named Veterok (little wind) and Ugolyok (blackie) spent 22 days in orbit before landing safely. This would be the longest doggy space flight in history. Dogs were favored because they could wear pressurized space suits with helmets.

The Americans had already sent up rhesus monkeys in iconic V-2 rockets as early as 1949 although two thirds of these pioneer monkeys died. Now in real competition with the Russians the U.S. sent up a squirrel monkey Gordo (fatty). He also lost a lot of weight but still sank to the bottom of the ocean when his landing craft's flotation devices didn't operate. Five more monkeys made successful flights from 1959 to 1960. America's chimpanzee, Enos was the first to make two safe Earth orbits. But the Russians would be the first to send a human Cosmonaut Yuri Gagarin into orbit in 1961.

In spite of that animal experiments continued. In 1970, a couple of bullfrogs were launched on a no return mission called Orbiting Frog. In 1972 Apollo 16 and 17 carried small pocket mice. The American Skylab carried the first fish and spiders. Spiders built the first outer space spider webs but there were no flies to catch.

The Russians sent up newts with their front limbs amputated to see how well they regenerated themselves. A wide variety of life forms underwent experimental space journeys.

In 2006 Bigelow Aerospace launched the first private space flight to carry live creatures. It had large "hissing" cockroaches, scorpions, ants, and Mexican jumping beans.

Any concept of animals as pets or space companions was too non-productive to justify expenses. Animals in space always had to be experimently useful. Some future established planetary colony may see animals as domestic pets. But as it was proven that the space environment would be safe for humans, animal experiments decreased, however animal rights organizations still criticize sending animals into outer space.

Lee Collins

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Dimming Stars, Erupting Plasma, and Beautiful Nebulae

Boasting intricate patterns and translucent colors, planetary nebulae are among the most beautiful sights in the universe. How they got their shapes is complicated, but astronomers think they've solved part of the mystery—with giant blobs of plasma shooting through space at half a million miles per hour.

Planetary nebulae are shells of gas and dust blown off from a dying, giant star. Most nebulae aren't spherical, but can have multiple lobes extending from opposite sides—possibly generated by powerful jets erupting from the star.

Using the Hubble Space Telescope, astronomers discovered blobs of plasma that could form some of these lobes. "We're quite excited about this," says Raghvendra Sahai, an astronomer at NASA's Jet Propulsion Laboratory. "Nobody has really been able to come up with a good argument for why we have multipolar nebulae."

Sahai and his team discovered blobs launching from a red giant star 1,200 light years away, called V Hydrae. The plasma is 17,000 degrees Fahrenheit and spans 40 astronomical units—roughly the distance between the sun and Pluto. The blobs don't erupt continuously, but once every 8.5 years.

The launching pad of these blobs, the researchers propose, is a smaller, unseen star orbiting V Hydrae. The highly elliptical orbit brings the companion star through the outer layers of the red giant at closest approach. The companion's gravity pulls plasma from the red giant. The material settles into a disk as it spirals into the companion star, whose magnetic field channels the plasma out from its poles, hurling it into space. This happens once per orbit—every 8.5 years—at closest approach.

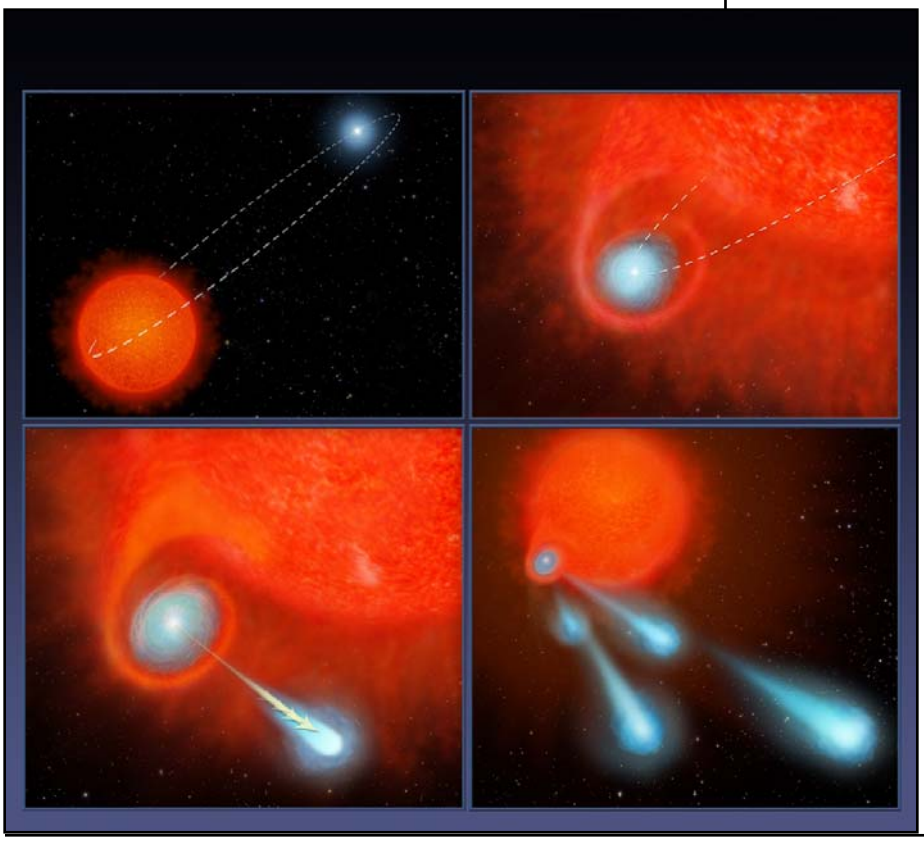
When the red giant exhausts its fuel, it will shrink and get very hot, producing ultraviolet radiation that will excite the shell of gas blown off from it in the past. This shell, with cavities carved in it by the cannon-balls that continue to be launched every 8.5 years, will thus become visible as a beautiful bipolar or multipolar planetary nebula.

The astronomers also discovered that the companion's disk appears to wobble, flinging the cannonballs in one direction during one orbit, and a slightly different one in the next. As a result, every other orbit, the flying blobs block starlight from the red giant, which explains why V Hydrae dims every 17 years. For decades, amateur astronomers have been monitoring this variability, making V Hydrae one of the most well-studied stars.

Because the star fires plasma in the same few directions repeatedly, the blobs would create multiple lobes in the nebula—and a pretty sight for future astronomers.

If you'd like to teach kids about how our sun compares to other stars, please visit the NASA Space Place:
http://spaceplace.nasa.gov/sun-compare/en/

Marcus Woo



This four-panel graphic illustrates how the binary-star system V Hydrae is launching balls of plasma into space. Image credit: NASA/ESA/STScI