Newsletter of the Pomona Valley Amateur Astronomers

In the beginning ... hydrogen. - ***Harlow Shapley***

February 6 ...stop
Shanahan B460...stop
Speaker is Dave Kary. ...stop
"Astrotracks - Space Music is Everywhere" ...stop
about astronomy references
in music (astromusic) in lots of
different genres and eras...end transmission.

Volume 35 Number 2 ***nightwatch*** **February 2015**

President's Message

I didn't get out to observe very many times in January, but when I did I had a great time chasing Comet Lovejoy. Although I've heard reports that the comet reached naked-eye visibility from dark sites, I've only seen it from Claremont, where binoculars or a telescope are required.

Unlike PanSTARRS a couple of years ago, which never got far above the western horizon as seen from our latitudes, Lovejoy was high in the sky throughout January, mostly in the relatively 'empty' area of the sky between the Hyades and the bright stars of Ares. For a while it was easy to find the comet by focusing on the Pleiades and simply scanning downward. Now it has moved on, past Triangulum to Andromeda.

I am fortunate to have an area in front of the house that is open to the sky but closed in all around, except for a long, narrow driveway. This gives me a quiet, protected spot to set up a telescope and leave it set up for a while. A fun trick has been to go out and sketch the comet and the surrounding starfield, then go inside for a while, then come back out and sketch the comet again. It's easy to see the comet move against the background stars in as little as a half an hour.

Elsewhere in space, SpaceX delivered another Dragon capsule full of cargo to the International Space Station on January 12, NASA's Opportunity rover celebrated 11 Earth years on the surface of Mars on January 25, and the New Horizons probe is waking up in preparation for its Pluto flyby this summer.

Our speaker this month will be Citrus College astronomer and PVAA member Dave Kary, who will speak on "Astrotracks - Space Music is Everywhere". I hope to see you there!

Mathew J. Wedel

HELP!

Tuesday evening, February 10th, the Club will be at the Ontario Main Library just off Euclid Avenue, 215 East C Street,Ontario.

Then the next night, February 11th, we will be supporting Science Night at Stork Elementary at 5646 Jasper St., Alta Loma.

Directions to Stork Elementary:
210 fwy to Carnelian (between Campus and Archibald).
Go north a little over one mile to Hillside Rd.
Turn left and go 1/4 mile to Jasper St. and turn left again.
The school will be on your right.

The location does have car access so that unloading shouldn't be a problem. Setup can begin as early as 4:30. Science Night begins at 6pm and runs until 8pm. Dinner will be provided for presenters during the set-up time.

Scopes and displays welcome! Jeff Schroeder will be there with his scope and some meteorites.

The moon will be in the first quarter for these events so viewing should be good. The school is expecting 300 or more participants for Science Night and the Library can draw up to 100 visitors! Please join your Club for these two fun events and enjoy sharing your knowledge of the night sky with others.

Claire Stover

PVAA General Meeting 01/09/15

PVAA President Matt Wedel started the January meeting by greeting the group and asking newcomers how they found out about our meeting. A couple heard about if from a friend that was a member and another actually sought out a local astronomy club, and found us. He also mentioned that you can check out a telescope from the Claremont library, just like a book, for a week at a time. (There currently is a waiting list, as the library only has two telescopes to loan out.) Matt then mentioned upcoming events, which you can see in the calendar section of our website at www.pvaa.us.

Our speaker for the evening was Alex McConahay from the Riverside Astronomical Society (RAS). The title of the talk was: "Up – Which Way Is Up?" Alex was very amusing when he tried to answer the question. "Most people let gravity decide the answer: Let go of an object, it falls 'Down', so the opposite direction is Up." That works for most things on Earth, but in Space – which way is up? On a map, North is "Up", while South is "Down". (That is why we call Australia "Down Under".) If we take the spin of the Sun, and make its northern (as compared to Earth's North) "Up", then we can say which way is "Up" for the Milky Way Galaxy. The problem is that our Sun, which currently is in the 'Northern' half of the Milky Way, will, as it rotates around the Milky Way's central axis, move to the 'Southern' half of the Milky Way, as it's orbit is at an angle to the central plane of the galaxy. Then there are galaxies that are 'edge-on' to us, and their spin is at right angles to our own. Even the Earth's axis is tilted 23.4 degrees to the plane of our orbit around the sun. Our maps show North where the axis of Earth's spin is, not North compared to our orbit around the Sun. Then there is the Magnetic North, which is moving from Canada to Siberia. Then of course the magnetic poles will flip (called 'geomagnetic reversal') which happens on the average of every 450,000 years.

But, alas, if you were in interstellar space, light years from any star, which way is Up? – There is no 'Up' or 'Down'. – Unless you have a map you are using to get you where you are going.

You can stand UP, look UP, there is UPcoming events, what are you UP to? "She UPped and left him", Sales are UP, Are you UP for this? He came UP behind me, get UP, the moon came UP, pump UP, follow UP, He stood UP, He was stood UP, He was UP front about it, He was UP front, Wake UP, Sit UP, Shut UP, Clam UP, Heads UP, StartUP, 7-UP, Thumbs UP, UPlifting, I need someone to step UP, He was UP $300 at the gambling table, he put UP $300. (Of course he could have put DOWN $300.) At least Alex didn't screw UP the presentation.

I looked 'up' "UP" in Wikipedia. I found out that it was a Disney film.

Gary Thompson

Club Events Calendar

February 6, 2015, General meeting
February 10, 2015 Star Party, Ovitt Library, Ontario
February 11, 2015, Star Party, Stork Elementary, Alta Loma
February 21, 2015, Star Party, Mecca Beach, Salton Sea
February 26, 2015, Board meeting, 6:15

March 6, 2015, General meeting
March 21, 2015, Star Party, Cottonwood Spr, Joshua Tree
March 26, 2015, Board meeting, 6:15

April 3, 2015, General meeting
April 18, 2015, Star Party
April 23, 2015, Board meeting, 6:15

May 1, 2015, General meeting
May 21-25, 2015, RTMC (anticipated date)
No scheduled Star Party.
May 28, 2015, Board meeting, 6:15

June 5, 2015, General meeting
June 13, 2015, Star Party

July 18, 2015, Star Party
July 23, 2015, Board meeting, 6:15
July 31, 2015, General meeting

August 15, 2015, Star Party
August 20, 2015, Board meeting, 6:15
August 28, 2015, General meeting

September 12, 2015, Star Party or Annual Mt. Wilson
September 17, 2015, Board meeting, 6:15
September 25, 2015, General meeting

October 10, 2015, Star Party
October 22, 2015, Board meeting 6:15
October 30, 2015, General meeting

November 12, 2015, Board meeting, 6:15
November 14, 2015, Star Party
November 20, 2015, General meeting

December 3, 2015, Board meeting, 6:15
December 11, 2015, Holiday Party, Sizzlin' Skillets 7:00pm
No scheduled General meeting.
No scheduled Star Party.

PVAA Officers and Board

Officers

President ….....	Mathew Wedel	909-767-9851
Vice President ..	Joe Hillberg	909-949-3650
Secretary	Howard Maculsay	909-624-1667
Treasurer	Gary Thompson	909-935-5509
VP Facilities	Jeff Felton	909-622-6726

Board

Lee Collins (2015)	626-852-9442
Ron Hoekwater (2015).....	909-391-1943
Jim Bridgewater (2016).....	909-599-7123
Karl Rijkse (2016)	909-428-1884

Directors

Membership / Publicity....Gary Thompson ..909-935-5509

Outreach	Jeff Schroeder	909-758-1840
Programs	Ron Hoekwater	909-391-1943

What's Up? - Pieces Of Sky

Those falling "pieces of sky" are called meteors (not shooting stars). Meteoric means an atmospheric phenomenon, as in the meteorology studied by weathermen. Once this included the Northern (or Southern) Lights. Now we can be precise in saying that meteors start out as meteoroids. Fragments floating in space which are too small to be asteroids but big enough to cause trouble when they crash into Earth's atmosphere. Their smaller size makes them difficult to locate until it's too late. While most meteors burn up in our protective atmosphere many reach the surface to become meteorites. Because of the sudden heating of enormous entry speeds, meteors will explode into a rain of pieces. The concussive effect of this explosion can be very destructive as when 1,500 people were injured by 2013's Chelyabinsk meteor (11,000 tons). They rushed to their windows only to be cut by flying glass. Or the infamous Tunguska Event explosion (1908) which knocked down a vast forest of trees. But sometimes smaller meteor break-ups can be rewarding, as when the Peekskill meteor (1992) broke up over New York. One football sized piece smashed into a young lady's parked car. It was first collected by police as a rock and used as a doorstop. But realizing what it was, she claimed it as having hit her property. It was valuable enough ($69,000) to allow her to buy a new car.

This meteorite's mistaken rocky identity was because it's was a stony meteorite. These most common (86%) meteorites are silicate chondrites. Those without chondrites are achondrites (8%) which can be bits blasted out of nearby planets like Mars or our Moon. The smallest in number (1%) are the stony-iron meteorites which contain silicates in addition to iron and nickel. But I think the most attractive are the iron-nickel meteorites (5%) which look like shiny black fusion-coated raisins.

How to find a "piece of sky"? Meteorite hunters know that many falls come down in oceans, rain forests or thick forested terrain. Chances of finding one in these locations are slim. Salt and water over eons will corrode away a meteorite. The best locations are dry treeless deserts. Logically the white ice sheets of Antarctica have also been a good hunting ground. It was here that a meteorite showing forms resembling bacterial fossils under an electron microscope was found. But it's been argued that magnetite minerals can form similar structures.

Recently, because of their value is greater than gold, some countries have put restrictions on meteorite collecting by proclaiming them to be national property not to be removed. Some Arabian countries have arrested hunters, seizing their finds.

Meteor showers originate from the predictable dust-filled orbits of comets. They're mostly icy pieces which burn up entirely in the atmosphere. I observed an impressive shower with PVAA several years ago. A famous American meteor shower in 1833 led to sinners confessing their sins. But I confessed my awe and wonder.

Really large meteors have left many craters through the ages. Many have eroded away, but Meteor Crater near Flagstaff in Arizona is still well preserved. About 50,000 years ago it exploded on impact leaving a crater 4,100 feet across and 570 feet deep. It's excellent museum has an interactive map of impact craters world wide. The crater was originally thought to be volcanic but a mining engineer, Daniel Barringer, laid claim hoping to find precious minerals like nickel. Sadly the explosion didn't leave much, and his search forced him into bankruptcy. His family still holds title to Barringer Crater.

Because it's now recognized that 65 million years ago the sudden end of dinosaurs was caused by a six mile wide meteor that struck today's Yucatan Peninsula, there has been an increasing interest in spotting killer asteroids.

An intensified search for earth-crossing asteroids began in 1973 with the formation of NASA's Spaceguard Survey. As a result thousands of larger suspicious objects have been catalogued, although the Chelyabinsky meteor shows that many can never be spotted before exploding in our atmosphere.

How would we deal with an large asteroid headed for Earth? We could hit it with a space craft changing its course to miss Earth. Or we could capture it and tow it into a safer trajectory. It would be a world wide effort.

But remember if a meteor lands in your neighbor's yard, grab it and claim it fell on your property. Those "pieces of sky" are very valuable.

Lee Collins

Minor mergers have massive consequences for black holes

When you think of our sun, the nearest star to our world, you think of an isolated entity, with more than four light years separating it from its next nearest neighbor. But it wasn't always so: billions of years ago, when our sun was first created, it very likely formed in concert with thousands of other stars, when a giant molecular cloud containing perhaps a million times the mass of our solar system collapsed. While the vast majority of stars that the universe forms—some ninety-five percent—are the mass of our sun or smaller, a rare but significant fraction are ultra-massive, containing tens or even hundreds of times the mass our star contains. When these stars run out of fuel in their cores, they explode in a fantastic Type II supernova, where the star's core collapses. In the most massive cases, this forms a black hole.

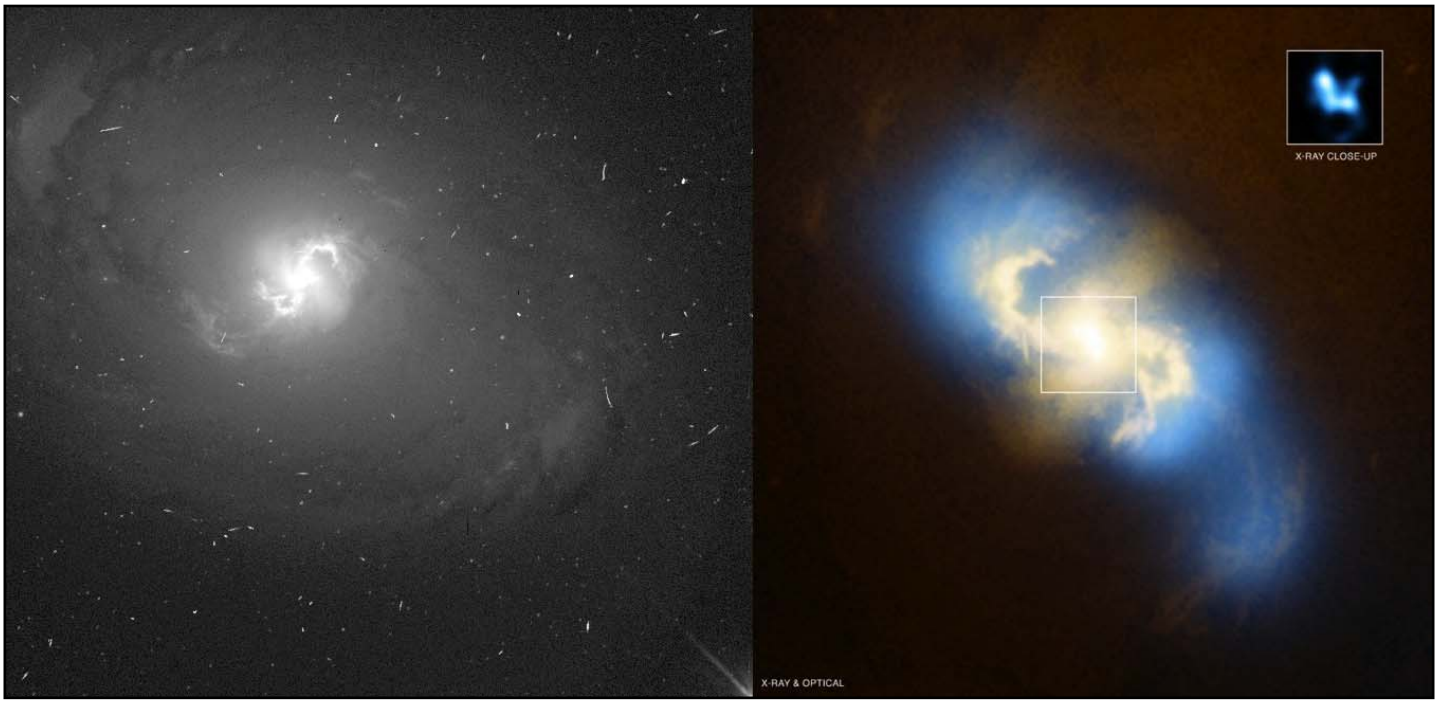
Over time, many generations of stars—and hence, many black holes—form, with the majority eventually migrating towards the centers of their host galaxies and merging together. Our own galaxy, the Milky Way, houses a supermassive black hole that weighs in at about four million solar masses, while our big sister, Andromeda, has one nearly twenty times as massive. But even relatively isolated galaxies didn't simply form from the monolithic collapse of an isolated clump of matter, but by hierarchical mergers of smaller galaxies over tremendous timescales. If galaxies with large amounts of stars all have black holes at their centers, then we should be able to see some fraction of Milky Way-sized galaxies with not just one, but multiple supermassive black holes at their center!

It was only in the early 2000s that NASA's Chandra X-ray Observatory was able to find the first binary supermassive black hole in a galaxy, and that was in an ultra-luminous galaxy with a double core. Many other examples were discovered since, but for a decade they were all in ultra-massive, active galaxies. That all changed in 2011, with the discovery of two active, massive black holes at the center of the regular spiral galaxy NGC 3393, a galaxy that must have undergone only minor mergers no less than a billion years ago, where the black hole pair is separated by only 490 light years! It's only in the cores of active, X-ray emitting galaxies that we can detect binary black holes like this. Examples like NGC 3393 and IC 4970 are not only confirming our picture of galaxy growth and formation, but are teaching us that supermassive relics from ancient, minor mergers might persist as standalone entities for longer than we ever thought!

Dr. Ethan Siegel

Check out some cool images and artist reconstructions of black holes from Chandra:
http://chandra.harvard.edu/photo/category/blackholes.html

Kids can learn all about Black Holes from this cool animation at NASA's Space Place:
http://spaceplace.nasa.gov/black-holes.



Images credit: NGC 3393 in the optical (L) by M. Malkan (UCLA), HST, NASA (L);
NGC 3393 in the X-ray and optical (R),
composite by NASA / CXC / SAO / G. Fabbiano et al. (X-ray) and NASA/STScI