nightwatch
Newsletter of the Pomona Valley Amateur Astronomers

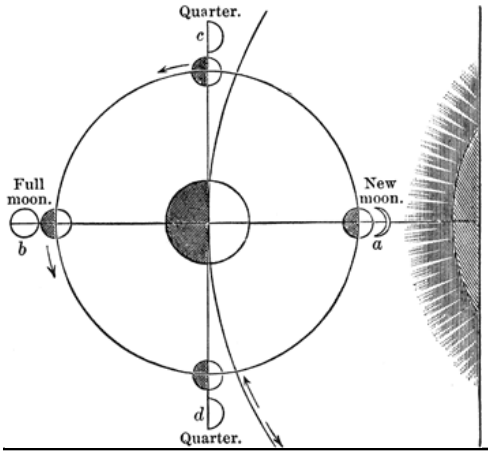
If Earth was the size of a basketball, the moon would be the size of a tennis ball and they'd be 25 feet apart.

Volume 31 Number 12 ***nightwatch*** **December 2011**

Seasonal Message

Professor Peter Barthel is an astronomer at the Kapteyn Astronomical Institute at the University of Groningen in the Netherlands. Last year he received a Unicef Christmas card that showed three children decorating a tree on a snowy hill beneath a waning crescent moon. What the card maker didn't understand was that a waning moon in the northern hemisphere doesn't rise until around 3 a.m. "I don't think the children would be out at that time," Prof. Barthel said and went on to examine the moon on other Christmas cards, wrapping paper and children's books in the Netherlands and the United States. He then sent an article to to the journal Communicating Astronomy with the Public detailing his findings. He found that forty percent of Dutch books and 65 percent of gift wrap were wrong. The U.S. fared far better because we show full moons more often.

"Now, watching beautiful natural phenomena like rainbows and moon crescents is one thing, but understanding them makes them all the more interesting," told the Guardian in an interview. I wonder if a paper on the aerodynamics of reindeer would have the same effect.



Merry Christmas to all, and to all a good night!

John Stover

Club Events Calendar

January 5 - Board Meeting, 6:15
January 13 - General Meeting
January 21- Star Party - Afton Canyon
January 27 Vinyard STEM Magnet School 6-8pm

February 2 - Board Meeting, 6:15
February 10 - General Meeting
February 18 - Star Party - Mecca Beach Campground
February 28 - Ontario Library Main Branch 7-9pm

March 1 - Board Meeting, 6:15
March 9 - General Meeting - Robert Piccioni
March 24 - Star Party - Mojave River Forks Regional Park

April 5 - Board Meeting, 6:15
April 13 - General Meeting
April 21 - Star Party - Cow Canyon Saddle , Mt. Baldy

May 3 - Board Meeting, 6:15
May 11 - General Meeting
May 19 - Star Party - To Be Announced
May 23 - 28 RTMC
May 31 - Board Meeting, 6:15

June 8 - General Meeting
June 16 - Star Party - To Be Announced

July 5 - Board Meeting, 6:15
July 13 - General Meeting
July 21 - Star Party - To Be Announced

August 2 - Board Meeting, 6:15
August 10 - General Meeting
August 18 - Star Party - To Be Announced

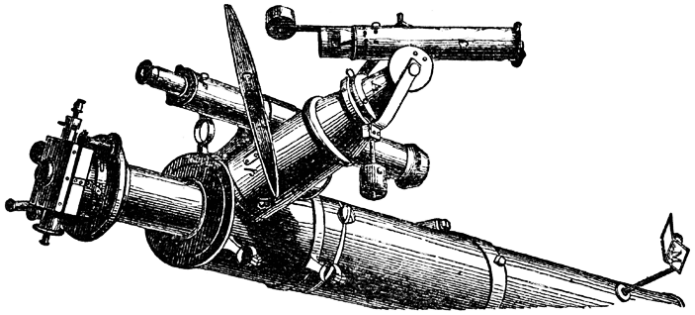
November General Meeting

The November meeting started off without our guest speaker and had Lee Collins wondering how long to make his presentation. Fortunately Bryan Penprase and past PVAA president Ron Hoekwater arrived during Lee's presentation. Gary Gonnella also passed around two pictures of the same object taken with different filters. The big announcement was the Christmas party on Friday, December 9th at Sizzlin' Skillets (275 East Foothill Boulevard, Upland, CA) at 7pm. The Grand Door Prize is a $100 gift certificate to Mount Wilson when we rent it out for a night again. [Mt Wilson does not honor the certificate, PVAA honors the certificate.]

Our Speaker, Bryan Penprase of Pomona College, is the author of the book "The Power of Stars: How Celestial Observations Have Shaped Civilization" His topic for the night was an overview of how we study the distant and early universe. He touched on everything from quasars, galaxies, spectral absorption lines and constellations and local cultures. - The Big Dipper has many names. - Names in Chinese, Arabic, Hawaiian, Alaskan, Navajo, Incas etc.. (In Hindu astronomy, it is referred to as Sapta Rishi, meaning the "Seven (Great) Sages".) He also brought up Stonehenge, Newgrange, the Pyramids and Chaco Canyon, N.M..

Bryan was very informative and had a lively and interactive presentation, with a lot of questions from the club members.

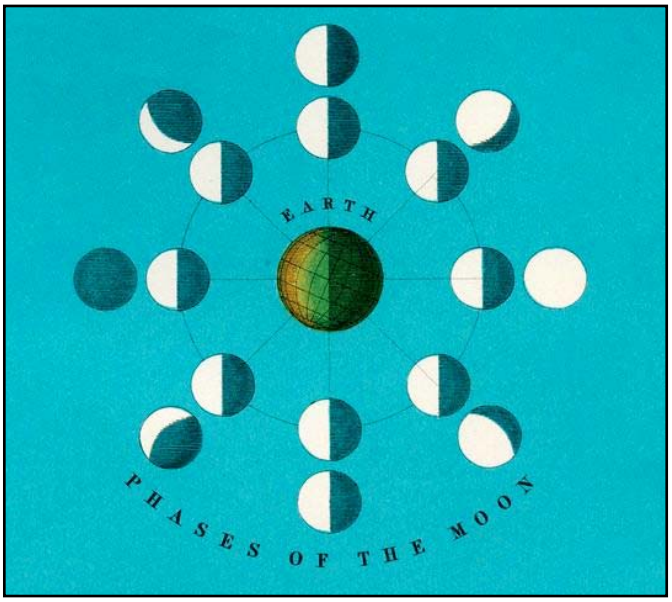
Gary Thompson



Ray Wiltsey Middle School

On Monday Dec 5, PVAA provided scopes for a science night at Ray Wiltsey Middle School in Ontario. We have been there before, and as usual, it was well organized by the school. There were exercizes in classrooms such as simulating craters with rocks and sand and charts showing the sky. Regretfully, the sky was very poor and only the Moon and Jupiter were available until late when Gary was able to catch the Orion Nebula in the 13" Dob. Regardless, the students, and family members were thrilled to see the moon craters, and the detail on Jupiter along with its four moons. There were about 125 students and 350 total people attending, so the scopes were busy. Participants were Gary, Craig, Bill, Ken, and Frank. Our thanks to the five of you for helping. The school really appreciated our efforts.

William (Bill) Connelly



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How Does It Work?

Most of us have binoculars but may not be familiar with how they work. Do we have the best choice for us.

Let's start with the basics. Somewhere on the binocular the expression 8x50, or similar numbers, may be written. In this case it is telling us that the objective is 50 mm and it has a magnification of 8. There may also be numbers which tell the FOV of the binocular. This is usually expressed as M feet at N yards. If we divide M by 3xN to get them both in the same units, we can calculate the FOV. If it said 300 feet at 1000 yards, for example, then we know that it has a FOV of 0.1 radians (300/3000). One degree is about 0.017 radians. So the FOV is about 6 degrees. The apparent FOV is the magnification times the actual FOV, 48 degrees.

The most common type can be thought of as a pair of straight refractors where each side is folded by a double prism. The primary purpose of the prism is to simply shorten the length in order to make the unit more comfortable to hold and use. But the prisms have the added bonus of making the image erect. Two prism types are used, the poro prism and the roof prism. The roof prism is more expensive to make but results in a slightly shorter overall length.

For star gazing it is usually recommended that the objective should be 50 mm or more. Finder scopes tend to start there. But everyone has a different dark adapted eye pupil size. For the best set, we should know what ours is. In the example we can divide the aperture by the magnification and see that the exit pupil of the binoculars is 6.25 mm. That's pretty good for an "average" dark adapted pupil of 7 mm.

But the size of the adapted pupil depends on the individual. As we get older it may not open as far. The effective aperture is the product of the pupil size times the magnification. Older people tend toward 5 mm. For them the effective aperture is only 40 mm (5x8). They need a 10x50 set to get all of the light available. A young person might reach 9 mm. They could take full advantage of an 8x72 set or a 10x90.

Hand held jitter becomes a problem if the magnification is over 6x. I have one with an 8x to 24x zoom lens. At 8x the jitter is tolerable. But at 24x I need some support to steady the scene. A monopod can be quite helpful but there are also tripod systems with low friction pivots to assist with large binoculars and high magnification.

The solution to hand held jitter offered by some companies is the "stabilized" binocular. To accomplish this, the prism inertia is used. The prism is isolated from the binocular case for small movement. Jitter may cause the case to move, but not the prism. But the prism must be returned to a case centered position for large slow movement.

This has been done in several ways. One way involves floating the prism in a low viscosity fluid inside a spherical chamber. Another uses gimbals. A weak spring can be used to return it to center. Each approach has its own advantages and disadvantages. Some are more stable than others under certain conditions. Some are more rugged. The first designs date back 40 years and were intended for military field applications. They were trying to achieve high magnification but not necessarily large apertures.

Ken Crowder

What's Up - Santa's Little Helpers?

No, Santa's little helpers are elves. I'm thinking of dwarves, dwarf planets, dwarf galaxies, and dwarf stars. They just aren't big enough to fit a full sized definition. They often get ignored, but sometimes as with Pluto their downgrading gets big media Disney-dog attention.

So let's start with those cute little dwarf planets. They are defined as objects orbiting the sun, massive enough to be round but too small to be full-sized (all are smaller than our Moon). There's five of them now, not enough to help Snow White, although some are snowy white because they are way out in the icy Kuiper Belt.

In 2006, the term dwarf planet was needed due to an increasing discovery of planets beyond Pluto that rivaled Pluto in size. The International Astronomical Union (IAU) has currently labeled Ceres, Pluto, Haumea, Makemake, and Eris as dwarves. Ceres (cereal goddess) and Pluto (underworld god) were both seen as planets when they were discovered but got smaller as time passed. Pluto is really a double planetary system. Its dance partner Charon (underworld ferryman) is eligible for dwarf status. Astronomer Mike Brown, who discovered Haumea (Hawaiian goddess of fertility), Makemake (Polynesian creation god), and Eris (goddess of argument) feels that more than 200 far-out dwarves will be found in the Kuiper Belt. He's lobbying for his other discoveries to become dwarves. That includes Quaoar (local California Indian god of creation), Sedna (Eskimo god of sea ice), and Orcus (underworld god of revenge).

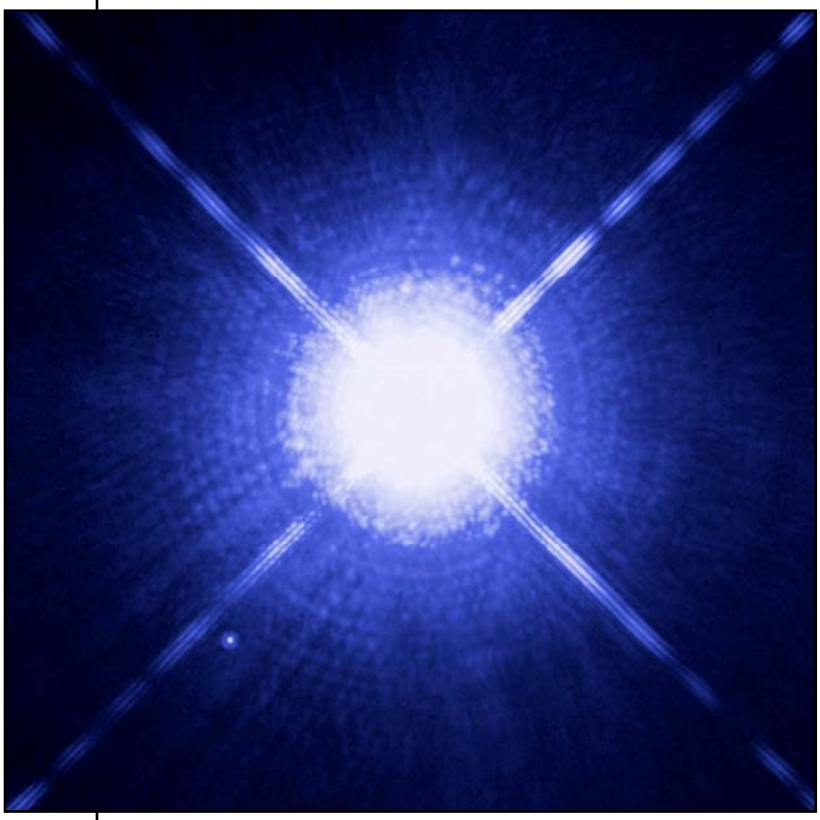
Next let's examine dwarf galaxies, which seem like a contradiction in terms. But there are 30 or more dwarves in the Local Galaxy Group. They frequently orbit larger galaxies. Andromeda Galaxy has M32 and M110 discovered by Messier. Milky Way Galaxy has the Large and Small Magellanic Clouds discovered by seafaring Magellan, although they had been long been known by Arabs who called them "the wandering sheep." They are the only cosmic dwarves easily visible to the unaided eye. Dwarves are likely the most numerous types of galaxy in the Universe. The average dwarf galaxy is made up of a hundred million stars. Many are created by interaction between, or are gobbled up by, giant galaxies. None are spiral, most appear as elliptical or formless fluff.

Lastly, let's look at dwarf stars which come in different colors like party lights. First there are red dwarves, probably the most numerous types of stars in the Universe. The closest star to the Sun is the aptly named red dwarf Proxima Centauri (4.2 ly) which orbits Alpha Centauri. Barnard's Star (6 ly) second closest star to the Sun (at 9th mag) was seen to have the greatest starry proper motion. A dim twenty of the thirty closest stars are red dwarves. Red dwarves are bigger than Jupiter but smaller than our Sun. They glow faintly with 0.01 percent of Sun's brightness. The neighborly red dwarf Gliese 581 has at least six extra solar planets. One was called the Goldilocks Planet because it was not too hot or too cold but just right for life. But doubt has been cast on this cozy planet by the fact that red dwarves mostly radiate infrared, have enormous sunspots, large flares and other deadly irregularities.

Next are smaller brown dwarves, they're even cooler. They glow faintly with heat left over from their formation. No chance of any life forms here.

White dwarves are the most explosively exotic. As a normal star collapses under its own weight it compresses its matter until its no bigger than an Earth sized planet. Now they become concentrated, plasma-heavy white dwarves. This was long dramatized by saying that a teaspoon of their extraordinary matter would weight millions of tons. Many novas occur when the gravity of a hot white dwarf sucks gas away from its larger companion resulting in an explosive instability.

One of the first known white dwarves was "the pup" a tiny



companion to Big Dog star Sirius (pictured). Procyon in the Little Dog also has a white dwarf orbiting it. The degenerate remains of a once larger companions.

Also many dying stars expand to a red giant stage then cast off their outer layers to form planetary nebulas. The star then collapses into an illuminating dwarf star in the center. No longer able to produce their own energy they will eventually die to remain as ghostly black dwarves.

Strangest of all are blue dwarves, a type that appears after a red dwarf has exhausted much of its hydrogen fuel supply.

Unseen dwarf stars and dwarf galaxies are one explanation for some of the gravitational dark matter in the Universe. So although the huge Universe is full of giants, they're hidden dwarves everywhere waiting to surprise us, if not help us. .

Lee Collins