



Newsletter of the Pomona Valley Amateur Astronomers

There is no reason that the universe should be
designed for our convenience..
John D. Barrow

Volume 31 Number 02

nightwatch

February 2011

Project Bright Sky Look What Your Efforts are Doing!

Over the past six years PVAA has been very involved in the area of visual and tactile astronomy for blind individuals. Many of you have been tremendous in this effort, Thank you !

Because of your efforts in Project Bright Sky not only are you providing a tremendous local outreach for individuals who are blind, but your efforts are inspiring others in different countries. We have teamed up with Astronomers Without Borders (AWB) www.astronomerswithoutborders.org to bring visual and tactile astronomy to individuals who are blind anywhere in the world, free of charge. Through this world wide organization, other astronomy associations in India and Brazil are launching their own.

A group in India is planning on expanding astronomy for the blind to sighted individuals who need wheelchairs.

A group in Brazil will provide planetarium sessions for the visually impaired, a radio astronomy project involving signals from stars, pulsars, and Jupiter and an astronomy conference for individuals who are blind.

In our current venture with Astronomers Without Borders there will be opportunities for many of you to join in and be part of Project Bright Sky. We are ready to be of help in classroom settings as well as visual events with ideas, telescopes, and other vision enhancing technologies.

We are in need of the following:

- Astro Imagers
- Tactile model makers
- Web cast experienced individuals
- Teachers willing to learn and share PBS lesson plans with other teachers via the internet

As you can see the means of sharing the universe with those who thought it was impossible for them to ever see anything through a telescope, see the universe by touch, or be able to reach an eyepiece of a telescope due to being in a wheelchair, are many. If you would like to be part of this unique astronomy outreach program please contact me at fbusutil2002@yahoo.com

Frank Busutil

Dates for Project Bright Sky:

- June 3, 2011 - Rancho Mirage Braille Institute
Deep Sky Objects Star Party at Joshua Tree National Park
- July - Summer Sky Star Party in Malibu
Junior Blind of America's Camp Bloomfield



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How Does It Work?

The green laser pointer that we use for pointing in the sky is an interesting instrument. The wavelength is 532 nm. By comparison the red pointers have a wavelength of around 650 to 670 nm. The eye response falls off rapidly between 635 nm and 680 nm. Color blind people can often see further into the infrared. The eye is far more sensitive at 532 and that contributes to our preference for the green lasers.

When a photon hits a particle, the manner in which it scatters depends on the wavelength. Backscatter is increased when the wavelength is comparable or smaller than the particle size. We have all enjoyed photographs from Hubble which look in the infrared band, beyond the visible. The infrared is best at passing through, rather than reflecting from, small dust particles. So, while red pointers seem to disappear into the night sky, the green ones look like a miniature spot light.

The first solid state lasers were made back in the early 1960's. Those were Gallium Arsenide (GaAs) diodes and everyone was trying to prove that they were actually lasers. Not much was known about lasers in those days.

A diode consists of two parts, called N and P, and a junction in between. The difference between the N and P is a small amount of some other element which changes the structure. This is referred to as "doping."

When an electron flows through the junction it loses energy. To do this it must give off a photon. The early diodes emitted at an infrared wavelength. As the technology improved it was found that other materials could be used to get different wavelengths. Today we can buy lasers and LED's at several different wavelengths.

The green laser is a much more complex design. First an AlGaAs diode is made which emits at 808 nm. That is used to "pump" a Neodymium (Nd) crystal. Several Nd compounds have been used including Nd:YAG (Neodinium Ytrium Aluminum Garnet). This is the same laser material that is used for "smart weapons." It emits at 1064 nm. The photons then are passed into another material, potassium titanyl phosphate (KTP) which acts as a "frequency doubler." When the frequency is doubled, the wavelength is cut in half. Thus we get our favorite, the 532 nm green laser.

Ken Crowder



Astronomy, a Life Journey

I see the pleasures of astronomy as relief from the work and clamor of our day-to-day journey through life. Astronomy edges aside the uncertainty of the work-a-day world and is unlike the contentious atmosphere of our political world or the unsettled nature of many of the world's philosophies, dogmas, and religions.

What astronomy does is to invite us to look beyond ourselves and our earth-bound surroundings to the source of all energy (the Sun) and to the distant planets and galaxies to which our species may someday migrate. Astronomy invites us to participate in amazing searches and to share in unfolding mysteries. Amateurs participate in this, sometimes even leading the way, and professionals often encourage us, accepting and trading insights with serious hobbyists like you and me. Thus, we share with Archeology the concept that amateur contributions are welcome and can be significant.

My own interest was ignited in college by Professor John Q. Stewart who with Henry Norris Russell (developer of the Hertzsprung-Russell diagram) wrote the number-one best-selling Astronomy textbook of the middle twentieth century, titled, appropriately, Astronomy. It came in two volumes, the first having to do with just the solar system and the second dedicated to astrophysics and extra-solar phenomena. It was Professor Stewart who guided my beginning studies and observing for several semesters. Interestingly, he and Russell could be seen on almost any sunny day, occasionally accompanied by another eminent scientist, Albert Einstein, all three quietly talking as they made their way across campus. Those were heady days for Physics and Astronomy — in fact, just down the road was Bell Laboratories where only a decade later, after a few phone conversations with Princeton scientists, the cosmic background radiation left over from the Big Bang would be described by Penzias and Wilson and win them the Nobel Prize.

At one point I almost decided to get a degree and make a career out of astronomy but somewhere along the road I read of a conversation similar to Cornell Univ. astronomer Carl Sagan's with his grandfather which went like this:

Grandfather- "So, Carl, do you know what you are going to do after graduation?"

Sagan- "Yes, Grandfather, I think I'm going to go into Astronomy."

Grandfather- "No, Carl, what I meant was, What are you going to do to earn a living?"

Fortunately, both of us made good choices — I ended up in a position that required travel to cities all over America and this often yielded several hours of spare time on either side of airline flights. Taking advantage of this by visiting local attractions, in time I discovered several cities that had large, second-hand book shops. There, occasionally, I would discover wonderful old astronomy texts at low, affordable prices. Who wouldn't treasure Percival Lowell's serious investigation back in 1906 entitled, Mars and its Canals?

Needless to say, we look back upon some of these writings and smile, smug in our present-day knowledge. But there is a lesson here, namely, that even if you are quite familiar with astronomy, you can be seriously misled from time to time.

Club Events Calendar

February 18 – General Meeting - Dave Jurasevich

February 22 – Colony Branch, Ontario Library, 6 – 8 PM

**March 5 - Star Party - Mesquite Springs, Death Valley
Alternate - RAS, Landers**

March 10 - Board Meeting, 6:15

March 18 – General Meeting - Dave Doody

April 2 - Star Party - Mt. Baldy RV Park

April 7 - Board Meeting, 6:15

**April 15 – General Meeting - Christine Pearce of
Columbia Memorial Space Center**

May 5 - Board Meeting, 6:15

May 6 – Wildlands Conservancy

May 7 - Star Party

**May 13 – General Meeting - Albert Dicanzio PHD,
"Remembering Galileo, an Astronomer's Legacy**

May 14 - Girl Scout Camporee, 4:30

May 25 - 30 RTMC

June 3 - Project Bright Sky - Cottonwood Springs

June 4 - Star Party - Cottonwood Springs

June 9 - Board Meeting, 6:15

June 17 – General Meeting

July 7 - Board Meeting, 6:15

July 15 – General Meeting

July 30 - Star Party - White Mountain

August 4 - Board Meeting, 6:15

August 9 – Main Branch, Ontario Library, 7 – 9 PM

August 12 – General Meeting

Aug 27 - Star Party

Derek Bok, former president of Harvard University, was once asked by an imperious mother, "What should my son expect from a Harvard education?" and he replied, after a pause, "A tolerance for ambiguity." Well, that was a great insight and it's a wonderful skill for our time, for anyone, for almost any field of endeavor and especially those of us who love astronomy. It's true, things may not be what they seem, observation and experience don't always yield an immediate and perfect answer. Sometimes the real answer remains concealed, beyond the scope of our present skills and tools. Contradictions and suppositions can abound but, occasionally, great lessons and answers lurk unrecognized, inside the data right smack in front of us — Tycho Brahe or the Bell scientists could tell you about that.

This is a great time to be in astronomy. More space exploration is before us, new exoplanets are being uncovered weekly, a Unified Theory still eludes us, and magnificent new amateur and professional instruments with capabilities undreamed of 50 years ago are on the drawing boards or actually under construction. Stay tuned! The best is yet to come and I'm very glad we have our PVAA club to help us stay close to all the action! .

Jay Master

What's Up? Three Beasts and a Witch

The great hunter Orion is followed by three beasts, two hunting dogs, Canis Major (big dog), Canis Minor (little dog) and their prey Lepus (hare) who hides beneath Orion's feet. Also below Orion's foot star Rigel flows Eridanus (river) where dwells the dimly illuminated Witch Head Nebula. But by far the most famous object here is Canis Major's dazzling "Dog Star" Sirius. The brightest star in the sky and the most idolized.

Sirius is the brightest because it's the second closest visible star system (8.3 ly.) after Alpha Centauri (4.3 ly.) Sirius is a star system because has an 11 magnitude white dwarf companion (Sirius B called the "pup") discovered by American, A.G. Clark in 1862. White dwarfs are born from the collapse of a red giant. They're typically smaller than the planet Jupiter yet are blazing with light. "The Pup" weights many incredible tons per square inch. It's hotly exhausting the last of its highly compressed hydrogen.

Sirius itself means searing hot, it's a young white-hot star. In Roman times when Sirius rose close to the late summer sun the combination was thought to cause more solar heat. In ancient Egypt Sirius was the dog-god Anubis rising with the flood of the Nile. These were the "dog days" of summer and the heat would cause more mad-dogs. A procession of the equinox has altered this, now Sirius an winter star. Today aircraft, auto engines, and Sirius Satellite radio proclaim its name.

Rising before this dog star Sirius is Procyon, literally meaning the "Pre-Dog" star. Coincidentally Procyon is similar to Sirius, it's an impressively white-hot star several times the size of the sun with a dense white dwarf companion. Like Sirius, it's close (11.4 ly) and almost as bright (0.4 mg). These neighborly dog stars contrast to the remote starry giants of Orion.

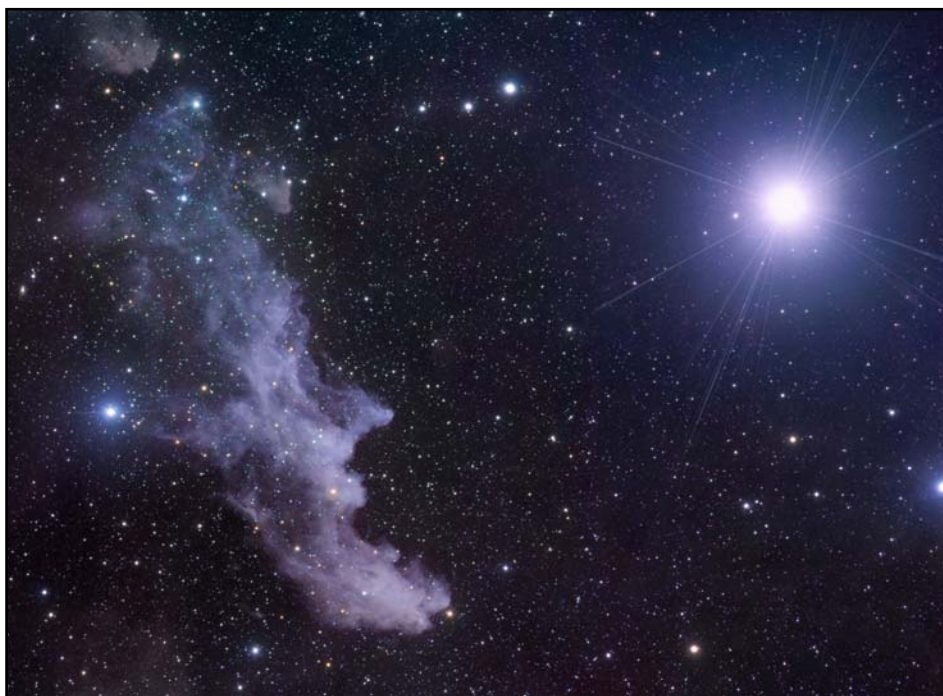
Near by are several Messier star clusters. In Canis Major's belly is the fine open cluster M41. Behind this big dog in Puppis (the poop) are clusters M46, M47, and M93. Near M93 is Xi Puppis a double star made of two distant giants.

An interesting reclusive star hides in Lepus the rabbit. This is Hind's Crimson Star, catalogued as R Leporis perhaps because it's ruby red in color. It's a giant Mira variable ranging from 5th to 11th magnitude. It's red dimness is caused by it's being a rare carbon star. It builds up a sooty shell of burnt carbon particles. So it's reddest when it's dimmest before it drives off some of its carbon. It was discovered in 1845 by John Hind who called it, "a blood drop...on the sky." Close by is M79 a reclusive globular cluster.

North of Hind's star and staring at giant illuminating Rigel is the Witch Head Nebula (IC 2118). Near one end of the river Eridanus this star nursery cloud of dust and gas is much larger and much fainter than even the Horsehead Nebula in Orion. Named by German astronomer Max Wolf a century ago its creepy (inverted) blue profile is 1,000 light years away.

The unimaginatively named constellation of the river Eridanus meanders down almost to the south pole and ends at the first magnitude star Achernar (Arabic for river's end). This star of the far south (best visible in the U.S. in Hawaii) is the fastest rotating and thus the flattest of bright stars. Other stars in the river's flow are Zaurak (boat) and Rana (frog). Eridanus is identified with many earthly rivers. The most likely link is with the Italian river Po often crossed by Galileo.

As Eridanus flows south it passes several faint "fill-in" constellations of the 17th century: Caelum (chisel), Horologium (clock), Reticulum (reticle-a telescopic grid), and Pictor (painter's easel). Of interest in Pictor, not far from second brightest star Canopus, is a close (12 ly) but dim (10 mg) red dwarf called Kapteyn's Star. It was discovered by Dutch astronomer Kapteyn in 1897 to have the second highest known proper motion. It moves the width of the moon in 200 years. That's impressive actually. Proper star motion was first noticed by Edmond Halley in Sirius when he compared its position to ancient charts.



Up closer to Eridanus' beginning lies the third closest star system (10.5 ly) visible to the naked eye. This is sun-like Epsilon Eridani (3.7 mg) which shows us how unimpressive our sun would appear at that distance. Always a SETI search candidate for extra solar intelligence, it is the nearest system with probable planets. Although it has dusty asteroid belts orbiting it, large planets are obviously clearing pathways. In science fiction it has been the home of numerous friendly and unfriendly alien civilizations. In Star Trek it was often mentioned as the location of Mr. Spock's planet Vulcan. So beneath hunter Orion lies a winding river and three beastly constellations each with its own wonders. Of course if you're in Australia, all these figures are tilted upside down and Orion, with Rigel in its handle, appears as a "celestial saucepan."