nightwatch
Newsletter of the Pomona Valley Amateur Astronomers

Discover the force of the skies O Men:
once recognised it can be put to use.. - ***Johannes Kepler***

"Which Way is Up?"
A whimsical look at direction,
movement, and orientation in the
universe by Alex McConahay.
January 9 in Shanahan B460.

Volume 35 Number 1 ***nightwatch*** **January 2015**

President's Message

This will be a short one, as I'm still digging out from all of the stuff, physical and digital, that came while I was traveling over the holidays. Lots to look forward to this year, including lunar eclipses in April and September, and the long-awaited Pluto flyby by the New Horizons probe this summer. Club-wise, there's not much to report. Everything is running as it should. This month's star party is January 17 at Afton Canyon. I'm hoping to make it out--Afton has some of the darkest skies I have ever had the pleasure of observing under. Weather permitting, we'll have an outreach at Bear Gulch Elementary School on the evening of Wednesday, January 28. Come out this Friday, January 9, to hear our frequent visitor and long-time friend of the club Alex McConahay. The title of his talk is "Which Way is Up?", a whimsical look at direction, movement, and orientation in the universe.

Mathew J. Wedel

Club Events Calendar

January 9, 2015, General meeting
January 17, 2015, Star Party, Afton Canyon
January 28, 2015, Bear Gulch Elementary Star Party, 6:00
January 29, 2015, Board meeting, 6:15

February 6, 2015, General meeting
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)

PVAA Officers and Board

Officers

President ….....	Mathew Wedel	909-767-9851
Vice President ..	Joe Hillberg	909-949-3650
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Outreach	Jeff Schroeder	909-758-1840
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What's Up? - Hidden Dwarfs

In folktales dwarfs are small and hard to find. In astronomy the red, blue, and brown dwarf stars are also small and hidden. Yet red dwarfs are the most common type of star in the Milky Way. They make up three quarters of all our galaxy's stars. Single red dwarfs are invisible to the unaided eye. Even in large amateur telescopes they're illusive, although over twenty of our thirty nearest stars are red dwarfs.

The closest star to our Sun is a red dwarf. Named Proxima Centauri, because it's approximately the closest at 4.2 light years. At 11th magnitude it's an orbiting member of the Alpha Centauri star system. This system is centered on two giant stars (4.4 light years) forming Alpha Centauri, the third brightest star in our sky.

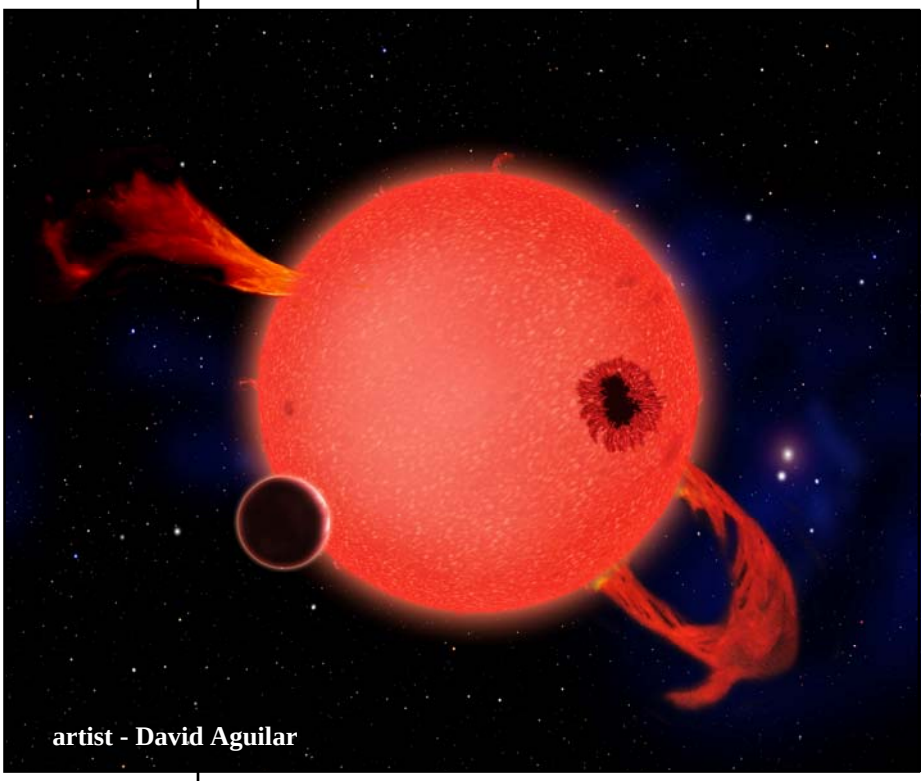
These cool, dim red dwarf stars are low in mass and fully convective. The helium they produce is constantly remixed, preventing a build up in their cores. Most have only some 10% of our Sun's luminosity. Although they are all brighter in the infrared. They burn very slowly and could last trillions of years. That's older than the estimated age of the Universe.

Next beyond the Alpha Centauri system is Barnard's Star (5.9 light years). Discovered by American astronomer E.E. Barnard (in 1890) it will be a red dwarf for 2.5 trillions years until it expands to form a only slightly brighter blue dwarf for another five billion years. At an age of 12 billions years its much older than our Sun's 4.5 billion years. Barnard's Star can be found in Ophiuchus at 9th magnitude and it's famous for having the highest proper motion (relative to our Sun) of any star. In a human lifetime it moves half the diameter of the full Moon earning it's "greyhound of the skies" nickname. The second highest planetary motion is also held by a red dwarf, Kapteyn's Star at 12 light years in the constellation of Pictor. The closer Barnard's Star has been the object of planned unmanned travel to another solar system. It's been examined for possible planets, but none have yet been found.

However some other close red dwarfs have extra solar planets. Gliese 581 has two of the most habitable planets (determined by their size and distance from their star) discovered so far. This brings up the question of planetary life in a red dwarf star system. A planet very close in would be tidally locked. One side would be very hot the other very cold. This would create a decidedly inhospitable atmosphere. Also, red dwarfs give off mostly infrared with no ultraviolet radiation, all contrary to Earth's plant-friendly visible spectrum light. Life as we know it could not evolve in such radiation. In addition, red dwarfs tend to produce a lot of sunspots which can periodically reduce output by as much as 50%. Finally, they're given to huge solar flares which can double their brightness for brief periods. A flare star is more bad news for any planetary life forms.

Most flare stars are dim red dwarfs whose outbursts, although analogous to the ones on our Sun, are huge relative to the small size of their stars. They're due to a magnetic reconnection in the dwarf star's atmosphere and their sudden increase is across the spectrum from X rays to radio waves. Proxima is known to produce sudden flares. Another close red dwarf star Wolf 359 (in Leo) is recognized for its infamous flares.

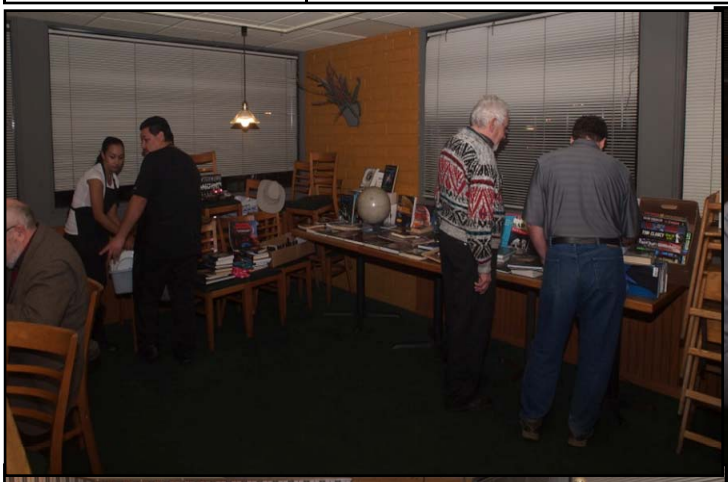
But the most infamous of red dwarfs is the hypothetical Nemesis. This fatalistically named star is postulated to be orbiting our Sun at a distance of 1.5 light years. It's elliptical orbit is conceived to be the cause of a cycle of mass extinctions in Earth's geological record that occur at intervals of 26 million years. This distant hidden companion would then cause a disruption in Oort cloud comets causing them to come raining into the inner solar system to crash into the Earth. But astronomers have yet to locate this dim "death star" menace. The extremely odd orbit of the icy dwarf planet Sedna has been said to be caused by a small companion star, perhaps a nearly invisible brown dwarf. But so far nothing has been found.

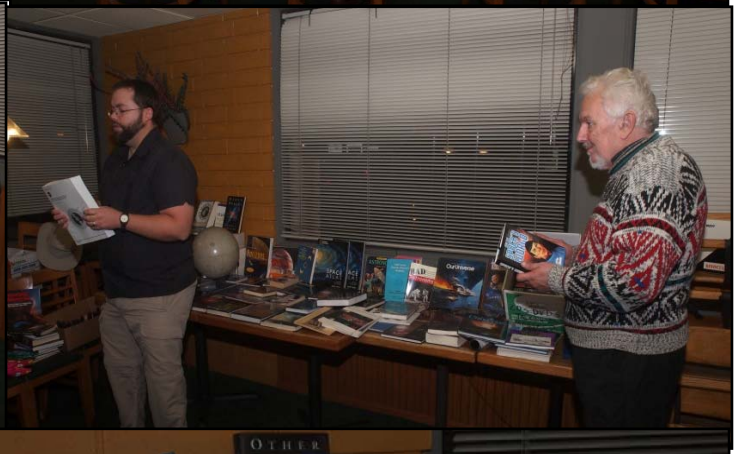

artist - David Aguilar

Brown dwarfs are smaller, dimmer, even more hidden than red dwarfs. They are so sub-stellar they're not massive enough to maintain hydrogen fusion reactions in their cores. They're between the mass range of a Jupiter sized gas giant and a tiny red dwarf. Such hidden dwarfs that they're difficult to find. Did they have fusion at some time in their stellar history? The nearest known brown dwarf is Luhman 16 at 6.5 light years. A few have planets, which must be far too cold for life.

So dim hidden dwarfs can be red, blue, or brown. They're our galaxy's smallest stars, and its most difficult to study.

Lee Collins






WHITNEY'S STAR FINDER
Stikky Night Skies
OTHER WORLDS
SPACE


CONNECTIONS






SPACECRAFT



Steak
Lobster
Tail


Backyard
Night Sky

All Photos by Ron Hoekwater

Stained "Glass" Earth

What better way to celebrate the holiday season than by giving a loved one a homemade gift? Space Place has just the gift idea for you—a stained glass Earth! This easy activity can be completed with a few simple items. It results in a colorful, translucent display of our home planet when put near light. Check it out here:

http://spaceplace.nasa.gov/stained-glass-earth.

NASA's Space Place is a NASA educational website about space and Earth sciences and technologies for upper-elementary-aged-children.