



I've loved the stars too fondly to be fearful of the night.  
*Galileo Galilei*

Newsletter of the Pomona Valley Amateur Astronomers

Volume 33 Number 6

*nightwatch*

June 2013

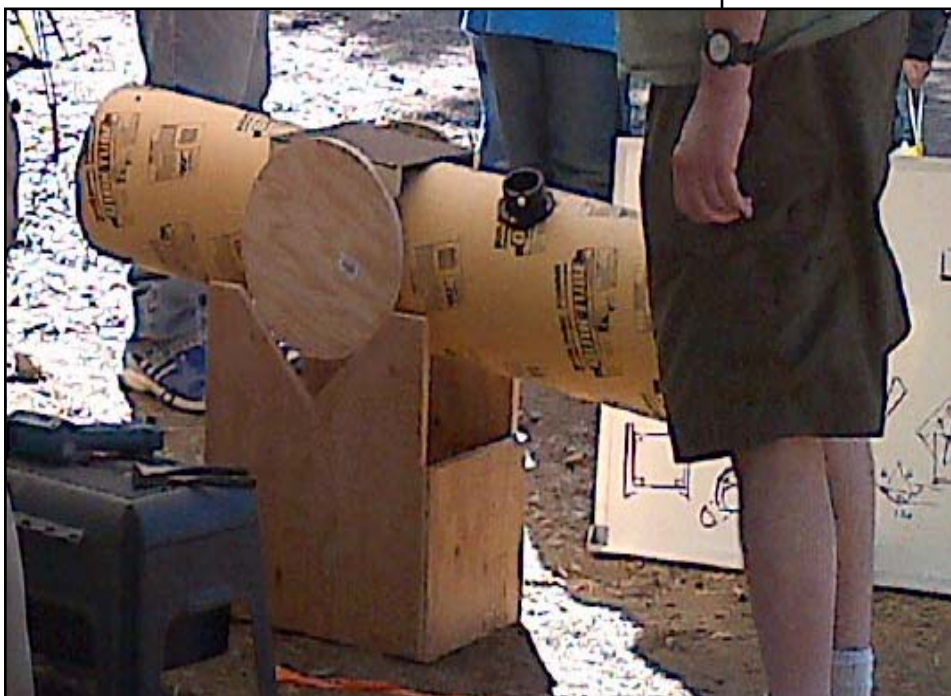
## PVAA Puts the **M** Back in RTMC

We made a telescope in two days! From glass blank to functional mirror. From surplus wood to usable telescope mount. All made by hand using tools available to our great-grandfathers in the 1890's.

Ludd Trozpek began mirror grinding on Friday and completed polishing on Saturday afternoon. During the mirror's formative life he allowed others to assist, but on it's second day Ludd became possessive. The self imposed timetable had produced anxiety during the finish polishing.

I created a barely functional mount from pieces of plywood and cardboard tube supplied by Ludd. An additional constraint to the construction was that it had to arrive in Ludds auto, therefore the plywood piece was shortened by some random amount. Only the items present could be used because it was too late to retrieve supplementary supplies. Minions were sent far and wide in hopes of securing used packing strap to reduce the friction of the pivot, all to no avail.

The focal length of the mirror was determined using a tape measure and focusing the sun's image on the edge of the canopy under which we worked. A lack of silvering on the mirror prevented us from setting the fabric ablaze and creating a memorable spectacle for all present. Initial adjustments were effected by viewing a Christmas ornament (hung from the flagpole with trifling care in hopes that collimation soon would be there). Initial tests indicated that the focal length had been over estimated, so the mirror mount was moved approximately one inch. While the scope was back in the work area we removed the odd half-dozen inches of extra tube on the upper end. Viewing commenced at dusk with the observation of Saturn with it's rings. Not bad for a telescope without silvering. Finally the Moon graced us by appearing from behind some trees allowing everyone a chance to view with our newborn telescope.



*John Stover*

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**President's Message**

The theme this month is "back to space". As I write this, three taikonauts have docked the Shenzhou 10 spacecraft to the Tiangong-1 space station. As an American, I look forward to the day when our country can send astronauts into space about our own rockets, instead of having to hitch rides in Russian Soyuz capsules. I hope that China's steady progress in manned space travel inspires our own government to invest more in our future in space, either directly by creating a viable successor to the space shuttle, or indirectly by continuing to support private ventures like SpaceX. As a human being, I am simply happy that there are more people up there now: six on the International Space Station, and three on Tiangong-1.

It's "back to space" for the PVAA as well, with the 'launch' of the second library telescope sometime in the next week. The library telescope program has been an unqualified success. We're getting a second scope largely because of demand for the first one: the waiting list has never been shorter than 20 weeks, and has usually been more like 25-26 weeks. Three-quarters of people who have checked out the first scope have gotten back on the waiting list to check it out again. The thing that makes me happiest about the program is this: even when our club doesn't have an outreach or star party going on, we are still bringing astronomy to people in our area. It's like an outreach that never ends.

Our speaker this month is Eldred Tubbs of Harvey Mudd College, who will speak to us about "The Laws of Mechanics". I hope to see you there.

*Matt Wedel*

**Club Events Calendar**

- June 21 - General Meeting - Eldred Tubbs -  
The Laws of Mechanics**
- July 6 - Star Party - Mt Baldy, Cow Canyon Saddle**
- July 11 - Board Meeting, 6:15**
- July 19 - General Meeting - Eric Grosfils - Oceans on Mars?**
- July 29 - JPL Tour 1pm**
- August 3 - Star Party -GMARS, Landers**
- August 8 - Board meeting, 6:15**
- August 23 -General Meeting**
- September 7 -Star Party - GMARS, Landers**
- September 12 - Board Meeting, 6:15**
- September 13 - Project Bright Sky Star Party - Cottonwood Springs**
- September 20 - General Meeting -  
Matthew Ota on E.E. Barnard**
- October 5 - Star Party - Salton Sea**
- October 10 - Board Meeting, 6:15**
- October 18 - General meeting**
- November 2 - Star Party - Anza-Borrego St Park Parking Lot**
- November 7 - Board Meeting, 6:15**
- November 15 - General meeting**
- December 6 - Holiday Party - Sizzlin' Skillets, 7:00pm**
- No scheduled Star Party**
- December 12 - Board Meeting, 6:15**



Tony Cook and son visit at RTMC



FROM SCRATCH  
IN TWO DAYS OR BUSY!  
FIRST LIGHT TONITE!  
TRY YOUR HAND AT POLISHING —  
we'll show you how!  
RTMC  
2013 DOOR PRIZE  
DRAWING





## What's Up? - Neighbors & Labors of Hercules

Hercules (Strongman) and his equally macho neighbor Bootes (Herdsman) both contain a lot of geometric asterisms which don't really look like a couple of stellar guys. But Hercules has its "keystone" shape which contains the brightest globular cluster in the northern hemisphere, M13. Nearby is

seems to fit the dung heap labor. But for astronomers the labor is finding globular cluster M13 that passes directly overhead. It can be seen by unaided eye if it's dark enough.

Often called the Great Hercules Cluster (pictured) at 6th magnitude. It contains over 300,000 stars is 100 light years in diameter and 25,200 ly. away. Nearby M92 is just as far away but smaller in size. At an age of 14 billion years M92 is one of the oldest known globular clusters. Messier catalogued a bright 29 globulars, now 160 have been found in our galaxy. The Andromeda Galaxy has over 500.



Globular cluster are gravitationally bound spherical star collections. They're found in a spherical halo around the galactic core. Studies show them to be as old as the galaxy itself, about 15 billion years. Because of their star density they have no gas or dust clouds. Interactions between these close stars creates many binary stars, white dwarfs, neutron stars, Pulsars, and blue stragglers. Two of the largest globulars are located away from the core and are so bright they were first classified as stars. The brightest is Omega Centauri (3rd mag) followed by 47 Tucanae (3.9 mag). Both are too far south to have been seen by Messier. It has been

M92 another attractive globular cluster. But it has no 1st or 2nd magnitude stars, so it's a maze you have to labor to see. Bootes is shaped like a giant kite, and contains Arcturus (Bear Guardian). It's the third brightest individual star in the sky (Alpha Centauri is a double star). In between them lies a neat curved asterism, Corona Borealis (Northern Crown) with it's gem of a 2nd magnitude star, Gemma. A dimmer star here, T Coronae Borealis is an unusual exploding variable called a Blaze Star. Every 80 years this star has gone from 10th mag to 2nd mag for almost a day.

But Hercules has the greatest mythological reputation. Many movies have featured the famous muscle man. There was a Disney cartoon, a popular T.V. show, and even "Hercules In New York" with Arnold Schwarzenegger.

The 12 Labors of Hercules connect him to other creature constellations that he must conquer. There's Hydra (The Serpent) that had to be killed. Every time Hercules cut off its head it grew two more. Hydra has become a monstrous unending problem metaphor. A lion (Leo) had a skin so tough no weapon could pierce it. So it had to be strangled and skinned to be worn as a cloak. A great bull (Taurus) had to be captured and there was a hellish dog (Canis Major?). There were also man-eating horses to be tamed and the cleaning of huge heaps of dung that fouled the great stables of Augeas. No constellation

suggested that they're the core remains of smaller galaxies stripped of outer stars by our Milky Way.

Hercules is also home to many double and binary stars. Rho Herculis is a good example. NGC 6210 is a dim (9th mag) planetary nebula which is unusual for its greenish color. Hercules is also the direction that the sun in moves in its orbit around the Milky Way's core.

Neighboring Bootes (Herdsman) is mythically associated with the Big Dipper when it is seen as a farmer's Plow. By following the Dipper-Plow's handle we can "arc to Arcturus" although at -0.04 mag it's not hard to find. It's bright because it's close (36 light years) and a huge orange giant some 27 times the diameter of our Sun. Other red-orange giant stars, such as Betelgeuse and Antares, are hundreds of times larger.

Arcturus is still expanding it will cast off its outer shell until it becomes a planetary nebula with a white dwarf at its center.

Other interesting stars in Bootes include Eta Bootis (Murphrid) which is only 3 light years away from the giant. A second magnitude star, Izar (Epsilon Bootis or Pulcherrima) is a tight, colored double star that looks good in amateur telescope. The primary is yellow-orange with a blue companion.

Bootes and Hercules are two manly constellations with unmanly geometric shapes but many deep sky objects.

*Lee Collins*