



Newsletter of the Pomona Valley Amateur Astronomers

*Blaise Pascal*

Man's greatness lies in his power of thought.

Volume 33 Number 3

*nightwatch*

March 2013

### President's Message

.Well, after a rather slow opening this year, all of a sudden things are busy around here--both on the ground and in the sky.

For one thing, it's Messier Marathon season, and I know that several club members are engaged in running marathons, either in recent weeks or in weeks to come. I ran my own marathon on Saturday, March 9--see my report later in the newsletter to find out how it went.

Messier Marathon season comes around every year, so at least we've seen that coming. Something we've been looking forward to for much less time is the arrival of comet PanSTARRS in the inner solar system. Although the comet has not reached the extreme brightness predicted by early estimates, it has still been naked-eye visible for the past couple of weeks and may remain so for a few more days at least. I first spotted it on the evening of Wednesday, March 13 from the top of the parking garage in downtown Claremont, but only with binoculars. I joined some other PVAA members up on Mount Baldy on Saturday, March 16, when the comet was easily visible to the naked eye, although small and not very detailed. The comet looks great in telescopes, with a well-defined nucleus and a broad, bright tail that is clearly brighter on one side than the other. It's my first naked-eye comet since 17P/Holmes in the fall of 2007, and I've enjoyed the challenge of fishing it out of the twilight.

Saturday, March 16, was also the date of the Claremont Public Library's annual Children's Festival. As we did last year, the PVAA hosted a table. Cori Charles is a representative of the Planetary Society and was giving out magazines and stickers. Jim Bridgewater promoted the library telescope, which we had on hand to show people. Frank Busutil took older kids on a "lunar challenge" to identify features on a big map of the moon, and Gary Thompson and I helped the younger kids draw the man in the moon, the woman in the moon, or one of the rabbits in the moon. We got lots of good feedback from the Friends of the

Claremont Library and from the library staff.

Speaking of the library telescope program, it's almost one year old now, and in continues to be popular and successful. The wait list for the telescope is consistently between 5 and 6 months, and three-quarters of the people who check out the scope get right back on the list. Everyone is so happy with the program that the Friends of the Claremont Library have volunteered to buy a second telescope, if we'll get it ready to go and do the maintenance (which is our responsibility for the existing library scope). I've discussed it with the other officers and board members and we see no reason not to move forward, so watch this space for news on a second library scope very soon.

Our speaker this month is Loredana Vetere, a visiting lecturer at Pomona College. Her Talk is titled "The Violent Universe", and it will cover Gamma Ray Bursts, the most powerful explosions in the universe, other high energy sources, how we can observe them, and what we learn from them.

*Matt Wedel*



Claremont Public Library on Saturday, March 16

## General Meeting 3/1/13

Lee started off the meeting with his “What's Up” presentation. This month's was centered on Taurus The Bull constellation. M1 the “Crab Nebula”, named by the Earl of Rosse in 1848, is the first entry into the Messier Catalog. (His drawing of it looked like a crab.) It is actually one of the dimmest of the Messier catalog, created in 1771. In the middle of the Crab Nebula is a Pulsar . - A highly magnetized, rotating neutron star. A neutron star is the stellar remnant of the collapse of a massive star after a nova or supernova.

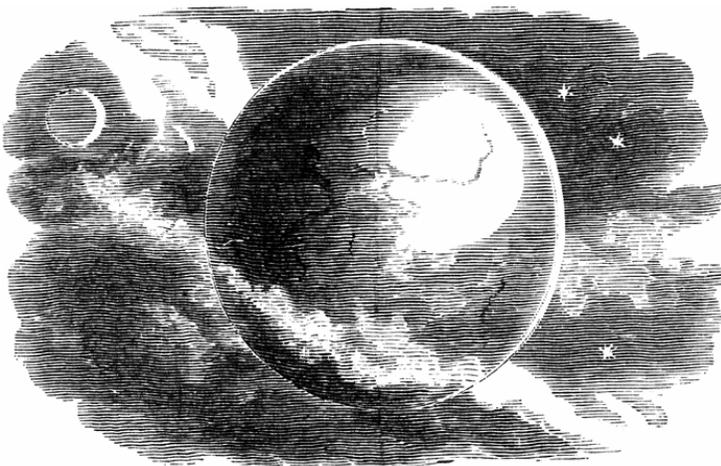
Lee then moved over to the brightest star cluster – the Pleiades – or the 'Seven Sisters', which is M45 in the Messier catalog. Lee showed several pictures of artists' renditions of the seven sisters with their names. The Pleiades is one star group that shows up in a wide variety of ancient cultures.

Mathew Wedel then gave some announcements, and we voted to move our starting month of PVAA's accounting year to April. Because this year is shortened to only 8 months, the dues for members that paid for last year will be \$20.00 instead of \$30.00, and for a returning family membership it will be \$26.50 instead of \$40.00. Any new members will still be \$30.00.

Lauri Bahri put out two sign-up sheets. One for a tour of JPL, and another for a tour of Goldstone. We also have a sign-up sheet for Mount Wilson observatory. We are renting the 60” telescope for our exclusive use on Friday night April 12th thru Saturday morning April 13th. The cost for each person is \$100. We are collecting the funds now. See Ron Hoekwater for more information.

The main speaker for the March 1st meeting was Tim Thompson. Tim worked at JPL before retiring. His subject was on the Hubble Space Telescope's Deep Field North (HDFN) and South (HDFS), the Hubble Ultra Deep Field (HUDF) and the eXtreme Deep Field (XDF or HXDF). The original Deep Field survey covered only 1/28,000,000th of the sky. To canvas the whole sky at this magnitude would take over 456,944 years. The Extreme Deep field shows galaxies down to the 30.7th magnitude. Based on that exposure there would be 177,567,260,870 galaxies in the universe. For Hubble to photograph the entire sky down to magnitude 30.7, it would take 2,047,498 years of exposure time.

*Gary Thompson*



## PVAA Officers and Board

### Officers

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## Check Out Coursera

If you want to have a free and fun learning experience with our hobby, Astronomy, I would recommend you check out

[www.coursera.org](http://www.coursera.org)

Coursera is an educational technology company founded in 2012 by computer science professors Andrew Ng and Daphne Koller from Stanford University.

Coursera works with universities to make some of their courses available online, and offers courses in engineering, humanities, medicine, biology, social sciences, mathematics, astronomy, business, computer science, and other areas.

Courses are offered in 5 different languages at 62 different universities and all online.

The choices change daily, but at this moment over 300 courses are offered ranging from a couple of weeks to a couple of months in duration. If the course is completed with the right grade a certificate of completion is handed out.

Don't underestimate the time needed and level involved, these are University courses despite the fact that some are called “Introductory”.

Certainly by taking Astronomy courses a solid knowledge of math, physics and astronomy come in handy. All Astronomy courses can be found under the topic “Physics” and 6 will start soon.

Courses are video lectures with Power Point slides, blog discussions with fellow students, home work assignments and tests to show the level of understanding.

Have fun with the new way of learning!

*Karl Rijkse*

## Astrophysics: Galaxies

The March 1st talk on Hubble Deep Fields studies by Tim Thompson reminded me of the mysteries of galaxies. The earliest references to observation by telescope indicate they were lumped with other faint fuzzies and considered to be nebulae. In 1750 an English astronomer, Thomas Wright, speculated that they might be stars held together by gravity. It was only 90 years ago that a serious debate led to later observations by Hubble and others who concluded that they were in fact external to our own Milky Way.

Thirty years ago Cepheids were the primary method of estimating distance. More recently supernovas, type 1a, have been preferred. Observations of red shift give evidence of age and rotation rates. Estimates were made of the total visible mass.

In 1970 Vera Rubin concluded from her studies of galaxy rotation that the visible mass wasn't sufficient to explain her observations. In 1971 the idea of a super massive black hole in the center was suggested. But that didn't solve the problem either. We'll look closer at this next month.

In the past 40 years astronomy has developed tools Galileo couldn't even imagine. Telescopes in orbit send back detailed color images. Large telescopes are viewing the stars every night. Multiple telescopes are coupled to make an even larger equivalent telescope. Radio telescope farms are being made larger. Spectroscopic instruments are collecting amazing information. The list goes on.

In our life time astronomy has evolved from a field that one person could fairly well understand and contribute to, into one which has numerous specialized disciplines. As a result we are now getting exposed to observations that suggest very new concepts of the origin of galaxies.

About 300,000 years after the Big Bang, it is thought that the first particles of hydrogen began to condense from the energy field in what has been called the "recombination" event. Dark matter probably formed at about the same time. The matter was fairly evenly distributed but the Cosmic Microwave Background observations indicate it wasn't perfectly smooth.

The most popular models today speculate the "lumps" of mass grew into larger clumps. Stars began to form and then they began to cluster into the first galaxies. As these began to further organize, the central "lump" may have grown until it could no longer support itself by nuclear fusion in its center and it collapsed into a black hole.

The first galaxies were probably very small and their stars were only made of hydrogen which was slowly fused into helium. Never the less, they would have appeared to have about the same shape as today from a distance. Then clusters of small galaxies began to merge and larger galaxies were formed. At this time the clusters of galaxies were probably much more numerous than what we see today.

We are just beginning to identify parts of our own galaxy, the Milky Way, which originated outside. We see old globular clusters whose stars appear to be much older than the majority. Their stars are all about two solar masses or less and are tightly bound by mutual gravitation. Open clusters seem to be much younger and fewer in number. They may have come from later mergers. Other cluster types are being identified as we get more

information. It seems reasonable to conclude that clusters are the consequence of past mergers of smaller galaxies.

Take a look at Andromeda and see mergers in progress. Two galaxies are apparently merging and one counter rotating area inside the main body of Andromeda is thought to be a past merger. Eventually Andromeda and our Milky Way are expected to merge.

The Virgo cluster is today one example of what has evolved after 12 to 13 billion years. The next time you look at a galaxy, think of the many galaxies that were needed to form the one you see.

*Ken Crowder*

### Club Events Calendar

**March 22 - General Meeting - Loredana Vetere -**

**"The Violent Universe"**

**March 22 - School Star Party - Evergreen Elementary School**

**April 6 - Star Party - Mesquite Springs, Death Valley**

**April 12, 2013 Mt. Wilson tour**

**April 18 - Board Meeting, 6:15**

**April 26 - General Meeting**

**May 9 - Board Meeting, 6:15**

**May 14 - Ontario Library Main Branch 7 - 9 PM**

**May 17 - General Meeting**

**May 22-27 - RTMC**

**June 8 - Star Party - White Mountain**

**June 13 - Board Meeting, 6:15**

**June 21 - General Meeting**

**July 6 - Star Party - Mt Baldy, Cow Canyon Saddle**

**July 11 - Board Meeting, 6:15**

**July 19 - General Meeting**

**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 20 - General Meeting**

**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 7 - Holiday Party, 7:00pm**

## What's Up? - No Lone Stars?

Although our sun is a lone star and they're common on flags, they're a small percent of the night sky. Most stars are likely to be binary, multiple, or part of a clustered group. The area from Perseus to Cancer is rich with such starry groupings.

Stars aren't lonely in the Perseus Double Cluster, two clusters so bright that Messier never catalogued them as a mysterious fuzzies. Perseus also has M34, an open star cluster faint enough that Messier listed it as a mystery object.

Perseus' most notorious star is the eclipsing binary Algol. Meaning "the ghoul" it's spooky variable cycle caused it to be seen as the severed head of ghoulish Medusa cut off by mythical Perseus. All part of his plan to use the demonic head to rescue his girl friend constellation Andromeda from Cetus the sea monster while riding on Pegasus. But today we know that Algol is variable because two stars orbit pass in front on each other, going from 4th to 2nd magnitude in 2 days. Composed of a dying orange giant and a smaller sun-like star, matter from the dying star passes over to the very close brighter star. This instability could bring about a supernova explosion.

Nearby Alpha Persei (Mirfak) isn't a lone star but is surrounded by an attractive cluster of stars. Perseus also contains the much photographed but faint California Nebula, a state-shaped gaseous cloud.

Moving over into Auriga (charioteer) we find that the sixth brightest star, Capella (she goat) is not one lone star but a very close binary of two yellow giants that orbit each other every 104 days. It also holds onto seven red dwarf stars making a total of nine.

The closest of the she goat's three "kid stars" is Epsilon Aurigae (Almaaz), a most extraordinary variable binary. It's a white super giant orbited by an oddly dark companion that produces the longest known eclipse period. The explanation seems to be that the dark star is wrapped in an elongated cloud of dust and gas. Here also is Zeta Aurigae, a normal 40 day eclipsing binary with an orange star and a blue one. In addition, Auriga contains a dramatically named emission nebula, The Flaming Star Nebula (pictured), where many newly clustered stars are being born.

Many never lonely stars appear in Auriga's number string of open clusters following Perseus' M34. Here are the attractive M38, M36, M37 and M35 in Gemini. This is Messier's only numerically logical group, although still not in order.

Gemini (twins) contains those 1st magnitude twins, Castor (horseman) and Pollux (fighter). While Castor seems to be a lone star, a telescope separates it into both Castor A and B that orbit every 470 years. Both these stars are also spectroscopic binaries.

In addition there is a distant Castor C made up of two red dwarfs. A total of six stars making up what seems to the eye to be a lone star. Brighter Pollux is eleven times the size of our Sun and strong enough to hold a small companion star.

Gemini also contains two dim planetary nebula, the much photographed Eskimo or Clown Nebula (NGC 2392) and a fainter Medusa Nebula.

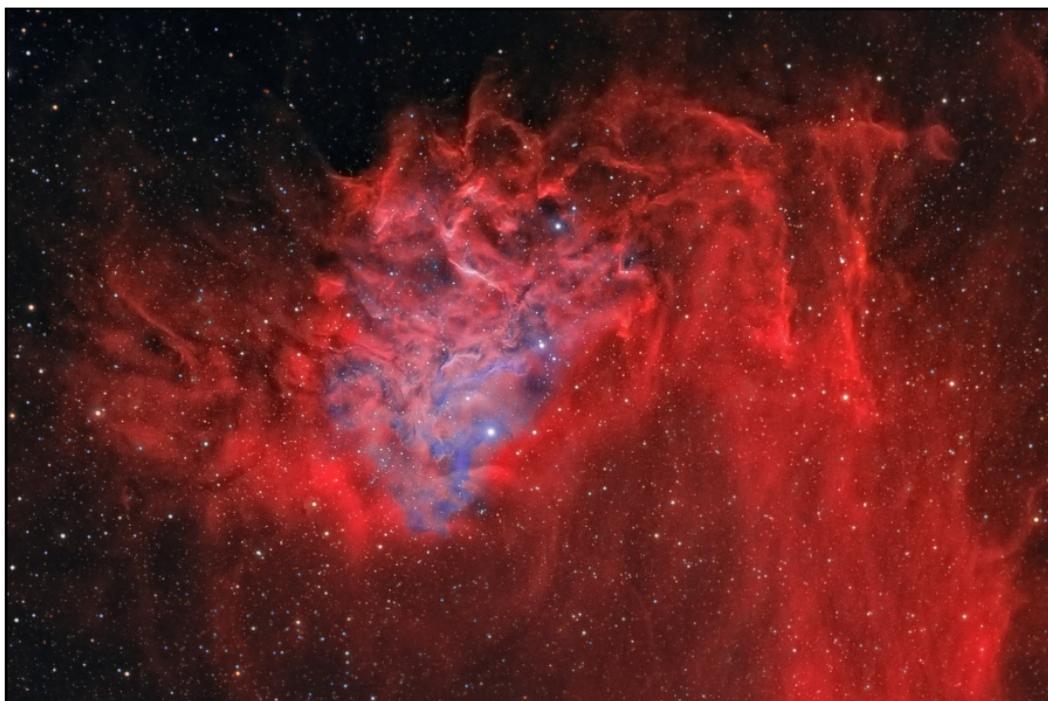
Going on into Cancer (crab) we find one of the brightest open clusters, the Beehive Cluster (M44). Reported by Hipparchus in 130 B.C. as a little cloud, Galileo first observed it with a telescope and announced that it was full of stars. In olden times it was known as Praesepe (manger of hay) and the two closest stars were asses who fed on this hay. They are Asellus Borealis (northern ass) and Asellus Australis (southern ass). But new telescopes showed triangular bee like shapes. So now the asses feed on a beehive of stars. Nearby is the Beehive's attractive neighboring open cluster, M67.

Poor Cancer is the dimmest of 12 Zodiac constellations. Crushed in a mythic battle with Hercules, in modern times it became a feared disease. Moon Children is what Astrologers call those born in Cancer, for fear of alienating business. In ancient times the Summer Solstice was in Cancer. The earthly line beneath this most northern solar height (Lat. 23 N) is the Tropic of Cancer (a match down south is the Tropic of Capricorn.) The winterless zone between, centered on the Equator, is the sunny Tropics. Sadly Earth's orbital procession has shifted the Summer Solstice to Taurus.

Cancer also has apparently lone stars like Zeta Cancri which telescopically is two stars. Iota Cancri will also divide into a double.

So this northern area is rich beyond lone stars, with binary, multiple, clustered stars, and even stars embedded in fuzzy nebulae.

*Lee Collins*





The Annual Children's Book Festival at the Claremont Library on Saturday, March 16th was a big success for PVAA and the Planetary Society. We teamed up with the Planetary Society at our tables. We expanded from 1 table last year to 3 tables this year.

We had the Claremont Library's 4.5" Telescope on display, and had a "Draw the Man in the Moon" activity for the younger kids, and "Find the Object" on a moon map for the older kids. Frank Busutil brought a ball to represent the sun, and a round pinhead to represent the earth. Everyone was amazed on how small the earth was as compared to the sun.

Cori, from the Planetary Society gave out the latest issues of the "Planetary Report." – The bi-monthly newsletter of the Planetary Society. She also had some "SOS" – Save Our Science – stickers and a few other things for the kids. Thanks to Jim Bridgewater we also handed out a lot of NASA bookmarks and pictures. Besides Cori, Jim & Frank - Mathew Wedel and Gary Thompson manned the tables. Lee Collins stopped by the table for a few minutes.

The Friends of the Claremont Library are interested in getting an additional telescope, as the waiting list is about a half year long.

All in all, it was a good day.



## Messier Marathon Report

On the evening of Saturday, March 9, London and I went camping at the Salton Sea, and I ran a Messier Marathon. I've done three previous marathons, with a previous best of 103 out of the 110 objects.

I was using a newish telescope setup: a 5" Orion Mak with a 50mm Stellarvue refractor mounted alongside. Having a small rich-field scope mounted alongside a planet-killer was a convenient, flexible combination.



The toughest of the evening rush objects were M110 and M74. M110 was tough because I'm still not used to the upright-but-reversed view through the Mak, and it took an embarrassingly long time to find. M74 is legendarily tough: a faint galaxy that is the closest Messier object to the horizon at marathon time. I did finally find it, thanks to the detailed finder charts in Harvard Pennington's Year-Round Messier Marathon Field Guide, a lot of looking, dark adaptation, and averted vision.

By 7:40 I'd bought myself some breathing room, so I knocked off for dinner. My second session was short but extremely productive: between 8:36 and 8:52 I logged 17 objects, and bought myself a longer break. Time for s'mores, and curling up with London to watch for shooting stars.

London sacked out at 10:30 and I got back to work, observing steadily until about 3:45. I pushed much farther into the morning rush objects than I usually do before I took my siesta. When I knocked off, I had 104 objects logged, so I was already in personal best territory. I figured I could afford 45 minutes of rest.

Somehow I always underestimate how brutal the morning rush is. M75 and M15 were easy, but at 4:50 the sky was getting noticeably brighter in the east. Not good! I popped down to M73 and nabbed it. Fortunately M2 is pretty bright and it was an easy catch at 4:57, but it was also my last catch. I did one last scan for M72 and M30, but neither were showing, so that was that.

I ended with 108 objects. I logged 72 objects only with one or both telescopes, 19 with binoculars only, and 17 with both binoculars and telescope.

How do I feel about the outcome? Well, there is no question that I could have logged M15 and M2 earlier in the morning, which would have left more time for M72 and M30. Maybe if I hadn't felt rushed I could have brought the full suite of techniques to bear on M72 that I did on M74, but I was hurried and less methodical. I think M30 was probably impossible, this early in the season and given the near-horizon haze—but I wish I'd gotten on target in time to give it a real shot.

Still, I am pretty darned happy. I missed getting the full slate of 110, but I didn't miss it by much, and 108 feels much more like Messier Marathon success than 103 did. Heck, the folks who invented the Messier Marathon were stuck at 108 for a few years themselves.

And I'm spoiling for a rematch. April 6 will be plenty dark, so if the weather is good, maybe I'll get another crack at bagging the whole enchilada.

*Matt Wedel*