



Newsletter of the Pomona Valley Amateur Astronomers

Volume 31 Number 04

nightwatch

April 2011

President's Message

First of all, many thanks to you all for the opportunity to serve as club president. I am honored.

Since I am relatively new to all of this, I'd like to use this first presidential message to tell you a bit about myself--if nothing else, it may give you incentive to elect someone more qualified come the general elections this summer! I have been interested in astronomy for as long as I can remember, but I didn't get into it as a hobby until the fall of 2007, when I was living in Merced. Before then, I always assumed that it was prohibitively expensive. Thankfully, that is not the case.

As soon as I got into astronomy I wanted to join a club, but the Merced club had been defunct for some years by the time I came on the scene. When my family and I moved to Claremont in the summer of 2008, one of the first things I did was look for an astronomy club to join. Purely by chance I stumbled across the San Bernardino Valley Amateur Astronomers first, and was a member of that club from 2008-2010. I have fond memories of that club and have good friends there, but it was too far to be convenient. One of my friends at work, Jeff Felton, introduced me to the PVAA and I have been a member since 2009.

Although I enjoy the moon and planets and observe them often, my real passion is for the deep sky. My current "big gun" is a 12" dob and my current observing project is the Herschel 400, on which I am about a quarter done. I do most of my serious observing on camping trips to the desert, but I also do a fair amount of grab-n-go observing at home or on short jaunts to Mount Baldy. I also enjoy doing sidewalk astronomy in downtown Claremont, about once a month when the weather is good. My astronomy blog is:

<http://10minuteastronomy.wordpress.com>.

By day I am an anatomist at Western University of Health Sciences, and my research is in paleontology. So I get to spend

about half the year cutting up dead folks and the other half working on dinosaurs, and I enjoy both about equally. I bring up day-job work because it will impact my service to the club: occasionally I miss meetings because I am out of town for conferences or research trips, or simply snowed under with teaching. I will usually know about these in advance so I can arrange for someone else to emcee the meeting.

My qualifications for the office are few. I have been teaching at one level or another since 1998, so I have no problem getting up in front of people and make a fool of myself. I have a passion for astronomy and for sharing it with anyone who will listen, or who I can drag to the eyepiece by main force. I think this is a great club, with a lot of cumulative experience and expertise. The current and former club officers are a great group of people who have taught me a lot and made taking on this job a lot easier—we are all fortunate to have them.

I don't have much in the way of an agenda as president. For now, I am busy enough just learning the ropes. I am embarrassed to admit that I know probably fewer than half of you by name--that's something I will definitely work on in the coming weeks and months. In general, I feel that the main functions of the club should be to share each other's good company and knowledge of the night sky, with each other and with the surrounding community, and I will work to forward those goals however I can.

One policy I will put into place right now: I am always open to suggestions from anyone on things that the club could do better, or that I could do better in service to the club (learning when to shut up is a possibility). Please feel free to drop me an email (mathew.wedel@gmail.com), leave a comment on my blog, or chat me up at the next club function.

Mathew Wedel

March General Meeting

After a few announcements, Mathew Wedel was voted in as President of the Pomona Valley amateur Astronomers. (Yes, only one “t” in Mathew.) He said that “Elections are in July, so if you’re not happy with me, you won’t have to suffer for long...” I’m sure that most will agree that he will be a good President.

March Speaker

Our speaker was Dave Doody. He is the Space Flight Operations Engineer from NASA’s Jet Propulsion Laboratory for the Cassini Team. He said that he doesn’t have any big telescopes, only two small ones – one 5.7 cm (~2.25 inch) f/3.5 refractor, and a 19 cm (~7.5 inch) f/10.5 Cassegrain. He couldn’t bring the two telescopes he is so proud of with him because they are mounted on the Cassini Spacecraft.

Learning from the Galileo spacecraft, the high gain antenna did not have to deploy during flight, and was installed in its working configuration at JPL.

Instead of using fuel to change the attitude of the spacecraft, Cassini uses Reaction Wheels, which is like a flywheel. This allows the craft to rotate around its center of mass. Speaking of mass, when Cassini was launched on October 15, 1997, over half the launch weight of Cassini was the propellant. Cassini took almost 7 years to reach Saturn. It flew by Venus (twice), Earth and Jupiter, using each planet as a gravity assist to increase its speed. On July 1st, 2004 Cassini fired her main engine for 96 minutes to slow down to drop into orbit around Saturn.

The original 4 year orbital mission has been extended to 2013. One of the reasons Cassini has lasted so long is that the team uses Titan, the biggest moon of Saturn, to do gravity assists every couple of orbits. This allows the spacecraft to conserve its fuel. One big mistake that was found out after the launch, was that due to the Doppler shift of the radio

frequencies when the Huygens probe to Titan was to be launched, Cassini would not be able to communicate with it as it fell through the atmosphere. The trajectory was changed so that Cassini was much further away from Titan when Huygens hit the Titan atmosphere, and the Doppler shift was not a factor.

Dave gave a very good presentation with a lot of pictures and graphs. You can get a lot more information on Cassini by going to these web sites:

<http://people.artcenter.edu/doody/talk/>

<http://saturn.jpl.nasa.gov/>

Gary Thompson

Astro Calendar, April 15 - May 13, 2011

It’s a wonderful time of year for exploring the deep sky. Almost all of the Messier objects are still visible between dawn and dusk, and a host of interesting galaxies in Leo, Virgo, Coma, Ursa Major, and Canes Venatici are culminating at civilized hours of the night. For the real night owls and early risers, the summer constellations of Lyra, Cygnus, Aquila, and Scutum are up before dawn, bringing with them the treasures of the summer Milky Way. Temperatures are generally favorable and there is much enjoyable observing to be had, if one can avoid the occasional clouds.

Moon Phases

- April 17 (Sun) 7:43 PM PDT - Full moon
- April 24 (Sun) 7:46 PM PDT - Last quarter moon
- May 2 (Mon) 11:50 PM PDT - New moon
- May 10 (Tues) 1:32 PM PDT - First quarter moon

Moon Conjunctions

- April 16 (Sat), nearly full moon passes Saturn in the eastern sky
- April 29-May 1 (Fri-Sun), waning crescent moon passes four bright planets--Mercury, Venus, Mars, and Jupiter--in the eastern sky, 30 minutes before sunrise

Planets Positions

- Mercury waxing crescent in the morning sky, inferior conjunction with sun April 9, greatest western elongation May 7.
- Venus waxing gibbous in the morning sky, following greatest western elongation on Jan 8.
- Mars rises before dawn, but stays close to the horizon.
- Jupiter rises before dawn, following conjunction with sun on April 6.
- Saturn rises shortly after sunset, following opposition on April 3.
- Uranus rises before dawn, in Pisces.
- Neptune rises before dawn, in Aquarius.

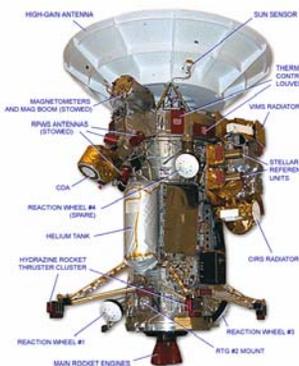
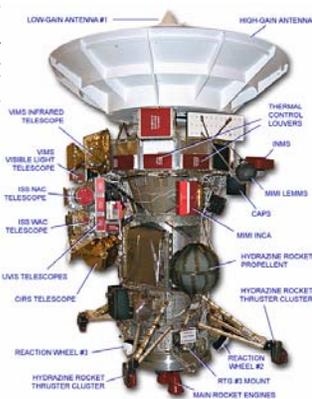
Planet Conjunctions

- April 19 (Tues), Mercury and Mars less than 1° apart, 15 minutes before sunrise.
- April 23 (Sat), Uranus 1° above Venus before sunrise.
- April 29-May 1 (Fri-Sun), Mercury, Venus, Mars, and Jupiter close to each other and to the waning crescent moon, 30 minutes before sunrise.

Meteor Showers

- April 22 (Fri) Lyrid meteors. Active April 16-25. Predicted to be an unfavorable year.
- May 6 (Fri) Eta Aquarid meteors. Active April 19-May 28. Predicted to be a very favorable year.

Mathew Wedel



Club Business

Friday, May 6, is our public star party at the Wildlands Conservancy. The very next night, Saturday, May 7, is International Sidewalk Astronomy Night. I plan to set up a scope in the public square in front of the Laemmle Theater in Claremont. Saturn and the first quarter moon should be well placed for both of these events, and some of the brighter winter objects should be visible as well, especially outside of downtown Claremont.

On May 14 the Girl Scouts will be having a Camporee at El Potrero (see our calendar). They will have 140 people there both scouts and adults. We should probably arrive around 5pm as they will serve dinner to us. Tent camping space is available, and a large "kitchen" building is available for those who have cots. Set-up south of the flag-pole and fire-pit. This is a large open area. No fires will be permitted because of the current danger. We'll be working with groups of 10 to 12 girls down per scope. Our primary contact is Karen Lopez and also Desiree Beyea. Both will be on site. There is NO cell coverage on site.

It's also not too soon to start thinking about RTMC, May 25-30 at Big Bear. Please see the RTMC website (linked from the club calendar online) for details.

Club Events Calendar

**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 7 - International Sidewalk Astronomy Night. Claremont

**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 12 - Star Party - Galster Park Nature Center

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 - Vatche Sahakian

Aug 27 - Star Party - Angelus Oaks

September 1 - Board Meeting, 6:15

September 9 – General Meeting

September 24 - Mt. Wilson Observing

How Does It Work?

The Cassegrain design refers to any folded reflector system which has a concave primary and convex secondary. The first published record appeared in 1672 and is attributed to Laurent Cassegrain. The "classic" Cassegrain design, however, has a parabolic primary mirror and a hyperbolic secondary mirror that reflects the image back through a hole in the center of the primary.

In 1930 Bernard Schmidt developed a wide field of view camera by placing an aspheric corrector plate at the center of curvature of a spherical mirror. The corrector plate reduced the aberrations normally associated with wide field of view spherical mirror systems. The camera was placed at the focus, half way to the center of curvature.

In 1940 Dmitri Maksutov developed a corrector plate consisting of a thin lens with a spherical inside surface. The center section was silvered to act as the secondary mirror. Instead of a camera in front of the primary mirror, the secondary placed the focus behind the primary through a hole in its center. With an eyepiece it now became a telescope. The fact that all optical surfaces were spherical and the secondary didn't require a separate structure made this a popular low cost design. This design was called the Maksutov Cassegrain.

Also in 1940, James Baker applied the corrector plate to a Cassegrain telescope and called it the Schmidt Cassegrain. With the corrector plate, lower cost spherical mirrors could achieve satisfactory image quality.

Creating an optical quality aspheric surface for the corrector plate was very time consuming and therefore expensive until about 1980 when computer driven polishing machines became available. Shortly afterwards the amateur telescope market gained a new affordable compact design. The Schmidt Cassegrain design became popular.

There are many named Cassegrain designs. But the third most popular design is the Ritchey-Chretien Telescope (RCT). About 1915 the American astronomer George Ritchey and the French astronomer Henri Chretien developed a design using hyperbolic surfaces for both the primary and secondary mirrors. The first successful telescope had a 24 inch aperture and was first demonstrated in 1927.

The RCT design is free of third order coma and spherical aberrations. It provides a much larger field of view than the other more popular Cassegrain designs.

Astrophotography normally involves long time exposures. For this reason any aberration will affect the image with faint blurring. The eye only integrates for 1/20th of a second and the image moves across the retina during that time. The brain simply doesn't recognize the faint blurring that a long time exposure will see.

The result is that the primary market for the RCT is for astrophotography. Refractory telescopes can produce similar quality but large apertures are expensive. For those really WOW images, the RCT with a field flattening lens is necessary.

Ken Crowder

What's Up? The Owl And The Plow

The Owl is the spooky Owl Planetary Nebula (pictured) discovered by Pierre Mechain in 1781 and tagged M97 by Messier. He only catalogued three planetary nebulae, M97, M27 Dumbbell, and M57 Ring. In 1848 the imaginative Lord Rosse named M97 the Owl when he saw two eyes. There is a theory that this round feathery face is the end of a dumbbell shaped tubular form. But hoo-hoo really knows? This envelope of a dying sun-like star could be as close as 1,500 light years away, so it's the largest PN. It's located just below the bowl of the Big Dipper or the Plow.

A Plow, or a Cart are just some the many different ways of seeing this famous seven star asterism. Of all the shapes in the heavens the Big Dipper is the most well known. Even the crazy painter Van Gogh painted it. This is certainly because its circumpolar position means that it's always visible in northern lands. The classical literary works that mention it are too many to list. It's larger identity as the Big Bear (Ursa Major) is also a part of many cultures. The word arctic comes from the Greek word for bear. Its curving handle-tail leads to Arcturus (bear guard). It's brightest star Dubhe is Arabic for bear. It's a very long tailed and limbed bear of course, but certainly a great beast of the frozen north. Some native Americans saw the three long tail stars as three hunters following the bowl bear. The double stars Mizar and Alcor were the cook hunter carrying his pot. Mizar and Alcor are the most celebrated of naked eye double star tests. Alcor means rider in Arabic. Mizar itself is a close telescopic binary.

In classic mythology this Big Bear was Callisto, one of Jupiter's sexual conquests (she also became a moon of Jupiter). Callisto was disguised as a bear to hide her from Jupiter's jealous wife Juno. Callisto's son Arcas was hunting and about to slay his mother when they were both placed in the sky as Big and Little Bears. But they are cursed to circle the pole and never allowed to sink to rest beneath the earth's horizon like other constellations.

But the Big Bear is more noted for its galaxies than its wild myths. Not far from the Owl Nebula is the faint galaxy M108 one of the last items Messier added to lengthen his list in the face of competitive cataloguers. The oddest of these was M40, which is merely two very close stars just above the Bowl. Near by is another controversial addition, M102. Some assume this to be the Spindle Galaxy (NGC 5907) an object much too faint for Messier to have seen.

But here are also some of the most famous of Messier galaxies. In the nearby Canes Venatici (Hunting Dogs that chase the bear) is M51, The Whirlpool. Discovered by Messier in 1773 it was observed by Lord Rosse in 1845 with his new Leviathan of Parsonstown 72 inch telescope. With this instrument Rosse could see its front-on spiral form. M51 became the first "spiral nebulae" and aroused much speculation. Until Hubble's confirmation of distant galaxies, it was thought to be a new solar system in the process of formation. Eventually it was understood that its smaller companion galaxy (NGC 5195) had brushed past it dragging one of its spiral arms along with it. So it became a prime example of galactic interaction. Other Messier galaxies in the Hunting Dogs are M63, the Sunflower Galaxy with its

mottled flowery texture, and the more compact M94. This galaxy rich area near our North Galactic Pole also contains M106, M109, and M64 the Blackeye Galaxy. Beyond Messier's catalogue this region offers as many galaxies as you have a telescope big enough to observe.

Returning to Ursa Major we find another "pinwheel" spiral galaxy, M101. Even before it was known to contain some 16 billion suns, Lord Rosse saw this broad face-on galaxy as being full of stars. Some of the first supernova observed in other galaxies were seen in M101.

Back north of the Dipper's Bowl lie the two popular galaxies M81 and M82. They are another example of galactic interaction. While the large M81 is a perfectly photogenic galaxy, its smaller companion M82 is highly disturbed. It's an edge-on mottled by a burst of star formation which resulted from a rough encounter with M81. It's sometimes called the Cigar Galaxy because of its shape and a "cigar band" which darkens its middle. This dark band is M82's most explosive area and it emits the strongest radio telescope signals. M82 contains the first known example an internal galactic explosion involving millions of stars. The two interacting galaxies were discovered by J. E. Bode in 1774 and have been intensively studied ever since.

So the Big Bear is a polar dipper full of arctic tales, old distant galaxies, and one hoot of an owl-eyed nebula.

Lee Collins



Speaker for April

Our speaker at the April 15th meeting of Pomona Valley Amateur Astronomers will be Christie Pearce, Manager of the Columbia Memorial Space Center.

From the website: <http://www.columbiaspacescience.org/>.

“The Columbia Memorial Space Center is a hands-on learning center that is dedicated to bringing the excitement of space science to children of all ages. Located in Downey, California, we strive to be the most accessible space science center in the Los Angeles area. Our 20,000 square foot visitor center is equipped with not only amazing technology and visual teaching exhibits, but also the friendly staff and atmosphere to help make them more enjoyable. And we’re adding more all the time.

The Space Center also hosts one of 48 Challenger Learning Centers on the planet, and the only one in the greater Los Angeles area. When operating, you can journey to the Moon and even experience the real-life excitement of Mission Control. Our CLC is available for field trips, team-building exercises and parties of 16 or more.”

Ms. Pearce’s presentation will be of special interest to teachers as the Columbia Memorial Space Center provides excellent teacher resources and is a great field trip destination.

Astronomy curious youth are very welcome so bring your children and grandchildren. The meeting starts at 7:30 PM and is located in Beckman Hall on the Campus of Harvey Mudd College

Ron Hoekwater

Messier Marathon at Owl Canyon

On the evening of Friday, April 1, I attempted my second-ever Messier Marathon. My first was last year, in February of 2010. That one was an out-of-season marathon, and only about 105 objects were visible, of which I observed 98. My goal this year was to break into the triple digits.

Owl Canyon Campground is a BLM public campground about 6 miles north of Barstow. It's a great place for camping, hiking, and stargazing, but not a site one would usually choose for marathoning. The campground is down in the canyon, and the canyon walls raise both the eastern and western horizons, which cuts down the time available for fishing the early evening and late morning targets out of the twilight. But it's close by, which was good because I couldn't leave town earlier than 4:00 on Friday and needed to be to my destination and all set up by nightfall. And the forecast was a bit more favorable there than any of my usual haunts, which had clouds predicted for shortly after midnight.

I was there with my friend Andy, and both of us were using 130mm reflectors and 15x70 binoculars. We were each armed with a checklist, the Sky & Telescope Messier Card, the S&T Pocket Sky Atlas, and Harvard Pennington's Year-Round Messier Marathon Field Guide. Andy got his first telescope last year and had not seen many of the Messier objects before our marathon attempt; for him the night was primarily about exploration and working on his object-locating skills. My 6-yr old son, London, was also along on the trip, for the fun of camping and our traditional morning-after hike.

We got to the campground well before sunset, made a fire, and roasted hot dogs for dinner. The sun set a little after 7:00 and by 7:30 we were picking out stars and constellations. Our first Messier object, unsurprisingly, was the Pleiades (M45), which we needed as a signpost to get down to the galaxies of the evening rush. We missed M74 and M77--the high western horizon cut them off before the sky was dark enough to see them. We saw M31 and M32 at 8:22, and M110 at 8:38, just before Andromeda set. M33 was another no-show; both of us suspected a glow at about the right place, but it was right on our local horizon and we couldn't be certain that what we thought we saw was really distinct from the twilight skyglow.

After that, things got easier. We nabbed M76, M34, and M79 before 9:00, and then paused for a few minutes to roast marshmallows. We were back in action by 9:20, roaming through the nebulae and open clusters of Taurus, Orion, Canis Major, Puppis, Gemini, Auriga, and Cancer.

We soon fell into a comfortable rhythm. My goal was to find as many Messiers as possible, and Andy's goal was to see them, and to get some experience using his scope under dark skies. He found many of the objects himself, with either his scope or the big bins, but for some of the less impressive specimens he cadged views through my scope. I set out a lounge chair and blankets for London so he could stay warm while he looked for shooting stars and satellites, and before long he was fast asleep under the stars.

For last year's Marathon I had used a 6" f/8 Dob, which I later sold when I moved up to a 10" Dob. This year I was using a 5" f/5 Newton on the Skywatcher AZ4 alt-az mount, and it was a

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Owl Canyon Continued

pleasant combination. With a low-power eyepiece, the field of view was about 2.5 degrees, and 5" is a lot of aperture under dark desert skies. Both of the trios of galaxies in Leo were easily seen in the same field of view, which allowed us to compare them during our brief study.

I had been somewhat dreading the Virgo-Coma "clutter" of galaxies. I got them all last year, but it took me about an hour and a quarter to slog through. This year went much more smoothly--I started with M60 at 11:08 and finished with M100 at 11:31, and that was allowing time for Andy to look at each one before moving on. Later on in the evening he realized that he had forgotten to look at M100. I had already moved on, but was happy to return to M100 by the simple expedient of panning around western Coma until I spotted the broad dagger of stars next to that big, bright galaxy.

After finishing the Realm of the Galaxies, we turned north, to Ursa Major and Canes Venatici. One of my favorite views of the evening was of M97, the Owl Nebula, and M108, a distant galaxy, shining brightly in the same wide field. M51 showed hints of spiral structure and its companion, NGC 5195, was interesting for its bright, almost star-like core.

We ended the first session of the night in the east and northeast, sweeping up globular clusters in Hercules, Serpens, Ophiuchus, and Scorpio, and catching the open clusters of Cygnus as they crawled over the horizon. Our final objects were the globs M9, M62, and M19, about a quarter after 1:00 AM. We covered our scopes and went to bed, with an alarm set for 3:30 to get us up for the morning rush.



We rose on time, but so had the clouds. Starting about 11:00 PM we had seen high, thin clouds in the south, but they had not gotten very far overhead nor threatened to interrupt our marathon. By 3:30 it was a different story--the whole sky was fogged over, with only a handful of the brightest stars piercing through the gloom. We crawled back into our sleeping bags, and that was that.

Our total for the night was 80 objects. If we hadn't gotten clouded out, I think we could have gotten into triple digits, although the high eastern horizon would probably have kept us from nabbing M30. But it was a fine night out under the stars, we both had fun and saw a lot of beautiful things, and we were well-rested in the morning, which almost never happens after a

marathon. As we cooked pancakes and bacon over the campfire, we talked mostly of the unreal beauty of the Great Nebula in Orion, and the experience of viewing starlight that has been traveling since the Age of Dinosaurs. I'm looking forward to a more relaxed observing schedule on other starlit nights this year--and to making another try for all 110 Messiers next spring.

Mathew Wedel

