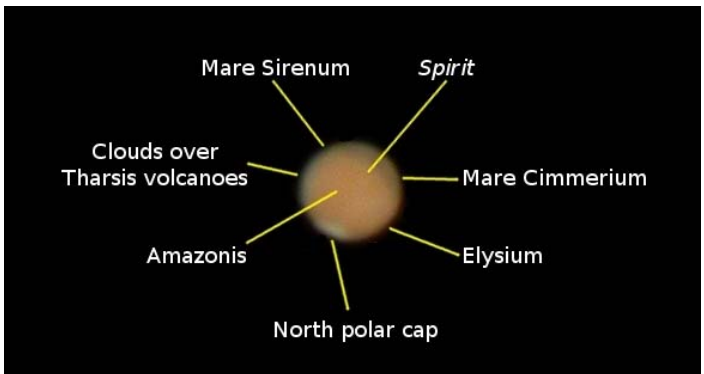
nightwatch
Newsletter of the Pomona Valley Amateur Astronomers

Volume 32 Number 02 ***nightwatch*** **February 2012**

President's Message

I haven't had a look at Mars through my telescope yet this year, but I have seen it with the naked eye a few times, when I've been out late at night. Mars has been much on my mind lately, because I've been rereading the Mars novels of Edgar Rice Burroughs. The first book, A Princess of Mars, follows the adventures of John Carter, an ex-Confederate officer who is mysteriously transported from the desert southwest to the desert planet. He is captured by warlike Martians, falls in love with a human princess, and goes through a series of chases, escapes, imprisonments, arena battles, and deadly duels. The tale was first published in serial form in 1912, when the "canal" theory of Mars was at its most popular. The Mars of Burroughs' novels is only sustained in a habitable state by the high technology of the dwindling races of Martians, in particular the canal system and the "atmosphere plant" that produces and distributes breathable air. The canal theory is a historical curiosity now; when modern astronomers get excited about Martian water, it's over braided fluvial systems that seem to change from year to year, based on high-resolution photos from the Mars Reconnaissance Orbiter.



Mars, January 25, 2010. Photographed with a Nikon Coolpix 4500 digital camera shooting through the eyepiece of a 6-inch reflecting telescope. Labeled in Photoshop, using maps from Sky & Telescope. By Matt Wedel.

Burroughs' Mars books are all ripping adventure yarns and they inspired much of the pulp science fiction of the early 20th century--and many of the science fiction films of more recent years, from Star Wars to Avatar. That circle is about to be completed: in this 100th anniversary of the first publication of A Princess of Mars, the story is finally coming to the big screen, in Disney's John Carter, set to be released on March 9.

Needless to say, I'm looking forward to the movie. But I'm also looking forward to hauling out a telescope and having a good look at the red planet. The thing that always gets me about seeing planets through a telescope is that I am forcefully confronted with how *real* they are. Of course, nebulae and galaxies and everything else "up there" is equally real, but as much as I love those things they don't have the same mythic hold on me as the planets. Even when I look up with my naked eyes and see Mars, I experience a curious sense of dislocation, knowing that Mars is really there. The canals may be (human) history, but the ice caps and canyons and volcanoes and dust storms are all just as real as you or me. And at least a handful of Earthlings really have been transported to Mars and have left their tracks on its dry, dusty plains. The fact that these have all been robots so far should not discourage us. To paraphrase Carl Sagan, Mars calls to us, possibly in a more profound and mysterious way than any other heavenly body. I don't know exactly when we'll get there, but I think we will actually get there, and have adventures no less exciting than those of John Carter.

I'm going a lot sooner. I have this weird device in my garage. It looks like a small water heater, but it's really a transporter. Very soon, I'm going to Mars. I'll let you know if I ever come back.

Matt Wedel

January General Meeting

Matt Wedel gave an overview of where we were with the Friends Of The Claremont Library and the proposed Library Telescope for the Claremont Library. They came up with a memorandum of understanding, which the PVAA Board approved in its February meeting.

Ron Hoekwater gave a brief presentation on the Apollo artifacts at the Nixon Library in Yorba Linda. Richard Nixon was president for all of the moon landings. They had a spacesuit on display that was worn on the moon.

Lee Collins showed some beautiful slides of M42 in Orion, along with the Horsehead Nebula, even displaying a photographic plate of the Horsehead Nebula from 1888. He talked about Emission Nebulae, Absorption Nebulae and Reflection Nebulae. An emission nebula is a cloud of ionized gas emitting light of various colors. The most common source of ionization is high-energy photons emitted from a nearby hot star.- A good example of this type of nebula is the Ring Nebula. An Absorption Nebula, (also known as a "Dark Nebula"), is a type of interstellar cloud that is so dense that it obscures the light from the background emission or reflection nebula (the Horsehead Nebula) or that it blocks out background stars (the Snake Nebula). Reflection Nebulae are clouds of dust which are simply reflecting the light of a nearby star or stars. Two good examples of this is type are the Pleiades and the Witch Head Nebula.

Our guest speaker for the night was Mike Hoffert, one of the original founders of the OCA (The Orange County Astronomers) and creator of the Manzanita Observatory with its 48" telescope.

(Yes, he had help.) It is on the Manzanita Indian Reservation, hence the name. The construction took 10 and a half months. The fork alone weighs 6600 pounds. It cost approximately $200,000 for the materials. The observatory is about 57 miles east of San Diego. The 48" is a F13.5 Ritchey-Chretien, situated on an open fork equatorial mount. It can be computer controlled to point and track with high precision or it can be manually controlled via a hand paddle. It was built in 1988.

Gary Thompson

Club Events Calendar

February 2 - Board Meeting, 6:15
February 10 - General Meeting
February 18 - Star Party - Mecca Beach Campground
February 28 - Ontario Library Main Branch 7-9pm

March 1 - Board Meeting, 6:15
March 9 - General Meeting - Robert Piccioni
March 24 - Star Party - Mojave River Forks Regional Park

April 5 - Board Meeting, 6:15
April 13 - General Meeting
April 21 - Star Party - Cow Canyon Saddle , Mt. Baldy

May 3 - Board Meeting, 6:15
May 11 - General Meeting
May 19 - Star Party - To Be Announced
May 23 - 28 RTMC
May 31 - Board Meeting, 6:15

June 8 - General Meeting
June 16 - Star Party - White Mountain

July 5 - Board Meeting, 6:15
July 13 - General Meeting
July 21 - Star Party - To Be Announced
July 24 - Ontario Library Main Branch Dark to 9pm

August 2 - Board Meeting, 6:15
August 10 - General Meeting
August 18 - Star Party - To Be Announced
August 30 - Board Meeting, 6:15

How Does It Work?

We have all looked at the night sky hoping to see the Milky Way only to be disappointed. The sky instead seems to be generally a faint blur of dim light. The term used to describe that is “air glow” and hand books will provide information in units of lumens per square meter per steradian (lm/m2/sr).

At my urban home, on a good night I can barely make out a magnitude 3 star. On a good night at Cottonwood springs I might see a magnitude 5. But the handbooks tell me that under the very best conditions, a person can see a magnitude 6 star. I may have seen a condition close to that on my vacation this year at Bryce Canyon National Park. It was a short drive to get away from the hotels where we stayed just outside the park and the Milky Way was sharp and clear.

Our atmosphere holds three types of particles in suspension - water, ice and aerosols. These combine in different ways to cause the sky to look the way it does. In this series I will discuss some of the different conditions and how it affects our ability to see the stars and faint fuzzies.

When light hits a particle it will be absorbed or scattered. Even under the best conditions the light from stars will be forward scattered by the particles in the air. Less atmosphere means less scatter, so observatories are usually placed at high altitude in dark places. In such a location the air glow will approach 1.6 x 10^(-4) lm/m2/sr. This is the value for the air glow due only by the forward scattering of starlight.

By contrast a very good night at the Salton Sea Mecca Beach might be four times that. At my home a great night is still fifteen times worse than what the high altitude observatories will have. The greater air glow is due to lights from the surface backscattered from the particles in the atmosphere.

What can we do about it? Well, the brightness of an extended object is measured in lumens per square meter per steradian. A steradian is just the units in the metric system for a solid angle. A hemisphere has two pi steradians.

To get the best results then for our scope, we can select an eyepiece to get a small solid angle and thus the maximum apparent spreading of the background. At some point the background appears black. A smaller eyepiece focal length won’t help beyond that point.

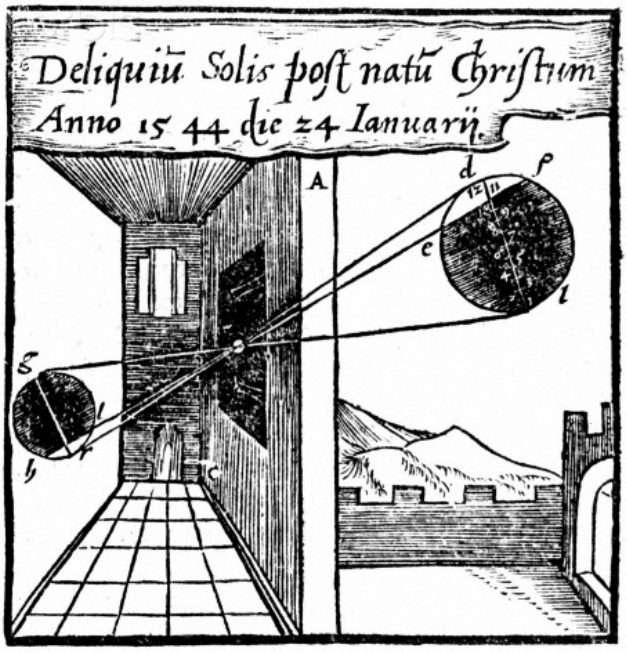
When the background is black, the handbooks tell us, the eye can detect an 8.5 magnitude point source. We will then be limited by the sensitivity of the eye instead of the scope. Thus to get the most sensitivity from our scopes we need to make the background effectively less than an 8.5 magnitude star or, in other words, 10^(-9) lumens per square meter. At that point our objective size makes a difference in the apparent brightness of a faint star. When the background is suppressed, the faintest star we can see will appear as an 8.5 magnitude in the eyepiece. For my 8 inch scope that will actually be a magnitude 15 star. A 12 inch scope can see a magnitude 16 star

Our eye has an instantaneous search field of view (EFOV) of about 22 arc minutes and a resolution of about 1 arc minute. Yes, the peripheral vision is much larger. But somehow the eye and brain combine to focus on just the EFOV when we are looking for small things with low contrast. Values as small as 6 arc minutes have been recorded when looking for small things with high contrast.

In the next article we will look at what it takes to do this for various scopes and make some surprising discoveries.

Do you have a topic you would like covered? Please send your thoughts to me at lcrowder@roadrunner.com .

Ken Crowder



PVAA Officers and Board

Officers

President .....Mathew Wedel ….....909-767-9851
Vice President ..Joe Hillberg.....909/949-3650
Secretary .....Bill Connelly.....714/329-4080
Treasurer .....Gary Thompson……909/935-5509
VP Facilities .....Jeff Felton.....

Board

Bill Vaskis (2013).....
Lee Collins (2012).....626/852-9442
Ray Magdziarz (2012).....909/626-8303
Karl Rijkse (2013).....

Directors

Nightwatch .....John Stover….....909/988-9747
Membership ...Ludd Trozpek.....909/624-3679
Programs .....Ron Hoekwater.....909/391-1943
Publicity ....Laura Jaoui.....

What's Up - A Weird Kid, A Dim Cat

That Weird Kid is Epsilon Aurigae in the constellation of the Charioteer (Auriga). This abnormal variable star is the closest of three "baby goat" stars next to their "mom" held by the Charioteer. "Mom" is Capella (Goat Star), the sixth brightest star (42 light years away) and a spectroscopic binary of two close giants who orbit every104 days. Capella also has seven red dwarf stars that accompany it (like Snow White). The 2,000 light year distant Epsilon (also called Almaaz by Arabs) is also a super giant but orbited by a weird dark companion that passes in front every 27 years. Its 9,883 day period is the longest known eclipse of any variable star. What is so large to cut the primary giant's light from mag. 2.9 to 3.8 for so long? Also the veiled starlight doesn't completely disappear. It seems that the eclipsing body must be a partly transparent flattened ring of dust and gas that is viewed edge-on. The nature of the cloudy disc and the massive hidden star in its center remain a mystery, but astronomers like a mystery.

Another unusual giant star is AE Aurigue (1,600 ly) Proper motion studies show that it may have been blown out by a supernova from the Orion Nebula region some 2.7 million years ago. It's still a runaway star moving into and illuminating a reflection nebula IC405. This creates a spectacular, but distant object, the Flaming Star Nebula (pictured).

Of course Auriga is really famous for its three open star clusters which can be spotted by the unaided eye. These are M37, the brightest and most southerly. It contains over 150 stars brighter than 12th magnitude as well as hundreds more. Moving north find M36 and M38. M38 even has a telescopic companion cluster, NGC 1907.

Auriga lies in the Perseus Galactic Arm and is rich in open star clusters. Next door in constellation Perseus at 4th magnitude is the famous Perseus Double Cluster (NGC 869, NGC 884). Easily visible, each cluster is the size of the full moon. Another cluster in Perseus is M34 at 5th magnitude.

Further north the circumpolar constellation of queenly Cassiopeia is full of binocular friendly open clusters. These include M103, M52, and the stick figure cluster NGC 457. Children like this figure with its bright starry eyes, long arms, and short legs. Traditionally called the Night Owl Cluster it has recently been seen as the film star alien, E.T.

Bright star clusters south of Auriga include M35 in Gemini. This moon sized cluster at the feet of Castor has a dimmer companion cluster NGC 2158. The four stars in Castor's feet are a Chinese constellation called the Battle Ax. Here is a fine binary Eta (Propus) at 3rd and 6th mag.

Both of the twin stars in Twins (Gemini) are binary stars. The star Castor (Horseman) itself is a complex six star system although amateur telescopes can only separate the primary binary with its orbit of 470 years. Twin brother Pollux (Fighter) has a small hidden companion. This reminds us that a majority of stars are multiple systems of two or more.

More radiant open clusters lie next door in Cancer (Crab). Here is the busy Beehive Cluster (M44). Near by cluster M67 is thought to be where our Sun was born since it contains so many Sun like stars.

But I haven't mentioned the Dim Cat yet. It's the only small cat constellation, Lynx. Created by the 17th century Polish astronomer Johannes Hevelius who said only the lynx-eyed could see its dim stars. That's because Lynx lies off the edge of the Perseus Arm in the deep Realm Of The Galaxies. Unfortunately most of its catty galaxies are more distantly dim. The brightest is 9th magnitude NGC 2683 near Cancer's border. NGC 2537 has strange clumps which give it the name of Bear Paw Galaxy. A notable object in Lynx is the most distant of globular clusters (182,000 light years) called the Intergalactic Wanderer because it's outside of our galaxy.

Between Lynx and the North Star lies an even dimmer constellation, the Giraffe (Camelopardalis). Giraffes were new and exotic in 17th century Europe, but why is an African animal is so far north. This "spotted camel" also has faint galaxies, the brightest of which is NGC 2403 at 8th magnitude.

So, here lie scattered galaxies off the edge of the Perseus Galactic Arm. While in the Arm itself are many star clusters full of hot young stars, often embedded in nebulosity. This is also an area of super gigantic stars. Here are many odd mysteries, but oddest of all is why Auriga the charioteer is holding a mother goat and three kids. Shouldn't he be watching the road?

Lee Collins