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# nightwatch

Newsletter of the Pomona Valley Amateur Astronomers

**Volume 24 Number 3** ***nightwatch*** **March 2004**

## *President's Message*

March is Messier Marathon month. Every year towards the end of March it is (just barely) possible to see all 110 Messier objects in a single night. The first few objects must be glimpsed as they set in the evening twilight while the last to straggle into view must be ferreted from the morning dawn. Careful planning and nearly ideal conditions are necessary if one is to complete the marathon.

The first attempts at seeing all the Messier objects in one night were made by amateur astronomers in the 1970s. There is some question as to who originally came up with the Messier Marathon, but much of the credit for popularizing the idea goes to Walter Scott Houston.

There are at least a couple of good books out on the subject of Messier Marathoning. One is ***Year-Round Messier Marathon Field Guide*** written by a PVAA member, the late Harvard Pennington. The other, ***Messier Marathon Observer's Guide, Handbook and Atlas*** is by Don Machholz. Either book is a great aid to anyone attempting a Messier Marathon. If you wish for more information on this topic, a man with more knowledge of astronomy than anyone else that I know, our PVAA Chief Observer, Bob Branch will be giving a short presentation at the March 5th general meeting.

The Messier Marathon is perfect for honing your observing skills and familiarizing yourself with the sky. It is extremely challenging, but can be great fun as well. The PVAA star party on March 20th at Mecca Beach on the Salton Sea is a chance to try the Messier Marathon yourself.

***Ron Hoekwater***

**Public Star Party**

Barnes & Noble Booksellers, Community Relations person, Casey Marcarello has invited PVAA to participate in a star party for the general public. The event is planned for the evening of March 26th at the Barnes & Noble store on

**Star Party Sites**
**(MBC)** Mecca Beach Campground (see page 4)
**(CS)** Cottonwood Springs campgrnd, Josua Tree Ntl. Pk
**(CCS)** Cow Canyon Saddle, Mount Baldy Village
**(MS)** Mequite Springs campgrnd, Death Valley National Pk
**(CWP)** Claremont Wilderness Park parking lot
**(TBD)** To be determined

## PVAA Events Calendar

| Month | Star Party | Star Party | General Meeting | Board Meeting |
|---|---|---|---|---|
| **March** | **MBC** | **20** | **5** | **25** |
| **April** | **TBD** | **17** | **2** | **29** |
| **May** | **TBD** | **22** | **4** | **27** |
| **June** | **TBD** | **19** | **4** | **24** |

Foothill Blvd. in Rancho Cucamonga. We hope to promote both the book store and our club to the science minded public. Jupiter, Saturn, and the moon will be up. It should be dark enough to start observing by 6:30 PM. If you can attend, plan on being there in time to be setup by then. Our opposition of Mars star party at Barnes & Noble last August was a great success. This is a wonderful chance to spread interest in astronomy and draw new members to PVAA.

***Ron Hoeckwater***

**February Meeting Report**

**Announcements**

We had three visitors to our evening meeting, one found us from our Web page, the other two from the notice of our meeting in the Daily Bulletin. One, Eldridge Tubbs, attended particularly because of the topic of our main speaker – more on that later.

February had Star Parties in both Death Valley and Cottonwood Springs – I hope some of you were able to attend. March features another trip to the Mt Wilson 60" telescope on the 13th and a Star Party in a new location – Mecca Beach Campground at Salton Sea – on the 20th.

Bob Branch spoke to us on the virtues of lunar observing. This hobby was very popular in the 1940s, after the end of World War II. Actual visits to the moon in the form of orbiting spacecraft and later actual human visitors to our prominent satellite led to a decrease in interest in our nearest neighbor as people saw little value in adding to the volumes and detail of these closer observations. The increased quality of current telescopes and of digital cameras has renewed interest in the Moon as dramatic observations can be made and recorded of its ever changing phases and shadow patterns. April's Sky and Telescope has an article with 100 objects to observe on the moon if you'd like to know what to look for. For those of us with schedules too busy to permit many trips to nearby dark sky sites or with blood too thin to enjoy the low temperatures often found there – lunar observing allows you to see a wide variety of sights from the comfort of your own urban backyard. It's hard to beat the advantages of a heated house and piping hot beverages a stones throw away from your telescope setup!

Lee shared with us some enlightening information about the sky in and around the area of the Pleiades. I've always wondered which of the Pleiades group were the actual Seven Sisters since there didn't seem to be just seven bright stars. The two stars to the left of the small dipper shape in the cluster are named Pleione and Atlas and they are the parents to the large brood of females. Counting the four stars in the central quadrilateral and the three to its right you get the seven sisters themselves: Alcyone, Merope, Electra, Celaeno, Maia, Teyegeta, and Asterope. All were named by the ancient Greeks.

**Featured Speaker**

Mike Keenan, history buff and nature enthusiast spoke to us in February. He talked about plans to preserve the markers used by Albert Michelson in

PVAA 24 HR. Hotline.
Get the latest news on the star party, club meetings, special events and astronomy happenings.call **909/596-7274**

***Visit our website at***
**http://pages.pomona.edu/~aka04747/pvaa/**

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1926 to determine the most accurate measurement up until that time, of the speed of light. This experiment was done right in our own backyard using a survey marker atop Mt Wilson, one approximately 22 miles away on Lookout Mountain near Mt Baldy, and two located down hill in the cities of Arcadia and Upland. Extensive documentation is required to obtain historic designation for these sites and the Lookout Mountain location activities are complicated by being located on land which is part of the Bighorn Sheep preserve.

Mike had done library research and field work to locate and document these four locations, some of which had markers lost to new construction or the digging of quarries over the years. He is working with the help of many others to get all this data submitted in the form required – a major undertaking.

The two locations in Arcadia and Upland and the accurate distance measured between them were used to triangulate and calculate the much harder to measure distance between the two mountain peaks – the distance light traveled in the 1926 experiments. The United Stated Geodetic Survey had a hand in the experiment as they hoped a more accurate measurement of the speed of light would assist them in their main mission – accurate mapping of the United States. Michelson placed a concave mirror with a small flat mirror at its focus securely atop Lookout Mountain. The purpose of this location at the eastern end of the experiment was simply to collect all the light it received and to reflect it straight back – to its origin at Mt Wilson.

Mt Wilson, in addition to being home to numerous solar and night time observatories was home to the more technical end of Michelson's speed of light experiment. His apparatus consisted of a jet turbine powered rotating mirror with eight sides. The beam from a powerful arc light entered into one side of the enclosed tube and was reflected off one face on the 8-sided mirror. It then shot off to Lookout Mountain and back, returning to the mirror which was rotating at over 500 revolutions per second. Air speed was adjusted until the light beam from the original light source and the beam returning from Lookout Mountain was reflected off adjacent mirrors in his setup. Michelson calculated the speed of light using the distance between the mountain peaks (calculated by the USGS from the flatland markers) the speed of the mirror, and the angle the mirror setup had moved during the light beam's 44 mile voyage. Michelson's experiment produced the most accurate measurement of the speed of light up until that time, and was off only 4 km/sec. Concerns about the accuracy of his results led him to the Irvine family ranch in Orange County from 1930 until his death in 1931. He was concerned that "shimmers of air" between the peaks and a possibly incorrect distance measured by the USGS affected his results so he attempted the experiment in Orange County within an air evacuated one-mile long light tube. Final results were also very close to the value used today but many considered his 1926 experiment the most accurate. Those of you who have met Don Nicholson on PVAA visits to the 60" telescope at Mt Wilson have met someone who witnessed the experiment in person – as a small boy on the mountain with his father, Seth Nicholson, staff astronomer at Mt Wilson from 1915 – 1957.

Now, to return to our meeting visitor. A few of us spoke to him at the blackboard following our meeting. He was a Physics professor at Harvey Mudd from 1963 – 1978. Professor Tubbs worked with some of students in the mid-1960s to try and recreate Michelson's famous experiment. He and the students placed a light returning mirror on Lookout Mountain, getting there via a trail he thought in retrospect was not the safest – especially after hearing of all the mountaineers lost recently in our local mountains. He borrowed a very expensive $1,200 (in 1960's dollars) helium neon laser and attempted to obtain new measurements from the top of Mt Wilson. His goal was not so much to re-calculate the speed of light since that had been determined with great accuracy by then but to see if the distance between the two mountain peaks had changed over the last 40 years. This was likely since an earthquake fault runs between them. Unfortunately reductions in Southern California air

quality between 1926 and the 1960s made detecting the returning light beam difficult, although they did detect a return once. Time limits on the student project and challenges in timing the borrowing of the expensive laser with expected clear nights along with difficulties in reaching Mt Wilson before the advent of today's freeways which speed our trip there cut short their efforts.

It was wonderful to hear from both Mike and Eldridge of the great efforts to determine and to preserve the monuments behind this important value - the speed of light. I think we'll all appreciate the work behind this number a little more the next time we quickly look it up in a CRC manual or on the Internet.

Please check out these links for more information on Michelson, Nicholson, and Mt Wilson:

http://oisc.net/Speed_of_Light.htm
http://www.astronomyoutreach.net/astronomers.d/nicholson.d/index.html
http://www.mtwilson.edu/

***Claire Stover***

**March Star Party**

This month's star party will be held on the 20th at Mecca Beach Campground on the Salton Sea. Mecca Beach Campground is about 10 miles closer than Cottonwood Springs. There are some lights at the site, but it is difficult to find a site with absolutely no lights. There are darker locations in the Salton Sea area, but they do not have restrooms. The horizons north and south are nearly flat. The eastern and western horizons are almost as good.

To get to Mecca Beach, take the 10 Freeway east to Indio/Coachella. Take Hwy 86S south to Hwy111. Head south on Hwy 111. Mecca Beach is the second state campground that you will come to, the first being the Headquarters/Visitor Center/Campground.

***Ron Hoeckwater***

**PVAA Interests**

There are many reasons one might join an association such as the PVAA. Among these reasons might be the desire to meet and share with others one's own observing experiences. Some members have extensively studied certain aspects of astronomy and some are involved in specified observing programs. Some of these might like to compare notes with those of like interests. This might take any form from an informal telephone or E-Mail conversation to regular meetings and documented research or anything inbetween according to the needs and will of the participants.

Some members might be willing to be a resource to those with less knowldge but of equal interest and a need for some guidance. A new member may not know where to go with this new found interest in astronomy. A sharing of experience and ignorance may result in not only more interest in astronomy but in the health of the PVAA as well.

With this in mind a list of willing members with special interests might prove helpful to the membership at large. Such a sign up sheet will be made available at this month's General Meeting of the club to determine if such interests exist.

**Spencer Crump**

**Program for March 5th Meeting**

Instead of one main speaker, our March general meeting will feature several concise (information rich) presentations. As always, Lee Collins will inform and entertain us with "What's Up." Bob Branch will speak on the apropos topic of Messier Marathons. Frank Busutil will talk about a project that he has been working on: astronomy for the vision impaired. Spencer Crump will outline a proposal for starting several special interest groups (i.e. solar observers, planetary observers, deep sky enthusiast, comet hunters, etc.). Ron Hoekwater will relate his experience "Searching for the Galaxy Cluster Behind the Beehive." Bob Akers will fill us in on two new comets, C/2001 Q4 (NEAT) and C/2002 T7 (LINEAR) and share with us his comet observing experience. And (if his employer will let him) Roy Schmidt will tell us about one of the most beautiful and fascinating objects in the sky: the Orion Nebula.

***Ron Hoekwater***

## Hubble Deep Field

One of the most remarkable astronomical images ever recorded is the Hubble Deep Field (HDF). For ten straight days in December 1995, Hubble stared at a single tiny patch of sky and collected all the light it could in over 350 separate exposures. Nearly a year of preparation preceded this observation. A piece of the sky near the handle of the Big Dipper (Ursa Major) was selected as it is away from the plane of our galaxy and is "uncluttered" by nearby objects, such as foreground stars. Test exposures were made in early 1995 with Hubble and from Kitt Peak observatory with the 4-meter. This confirmed that the field was devoid of large galaxy clusters, which would interfere with seeing farther and fainter objects.

The spot chosen for the HDF is located near the Big Dipper for a good reason. Because Hubble circles the Earth every 97 minutes, the Earth usually comes between Hubble and its target once each orbit. Only when Hubble is pointed nearly due north or due south can it stare continually at the sky without the Earth getting in the way. This allowed Hubble to take exposures uninterrupted for a week and a half. Each exposure was typically 15 to 40 minutes long. Separate images were taken in ultraviolet, blue, red, and infrared. Astronomers processed the frames, removing artifacts such as cosmic rays, and combined them into one final amazing picture. Each time they added a picture, the view got deeper, revealing fainter objects. When they were done they had the deepest picture ever taken of the universe.

Although there are thousands of galaxies visible in the HDF, it is a very tiny patch of sky. The field is considered representative of the typical distribution of galaxies in space because the universe, statistically, looks largely the same in all directions. Most amateur astronomers in the northern hemisphere spend little time observing the region near the pole since it is relatively devoid of objects compared to southern views near the galactic plane. To get a feel for how tiny an area of sky that was imaged, bring a needle with you the next time you go out to observe, hold the needle at arm's length, and look through its eye.

Most of the galaxies are so faint (nearly 30$^{th}$ magnitude or about four billion times fainter than can be seen by the human eye) they have never before been seen by even the largest telescopes. Some fraction of the galaxies in this menagerie probably date back to nearly the beginning of the universe. The term "deep" in an astronomical sense means looking at the faintest objects in the universe. Because the most distant objects are also among the dimmest, the image is the equivalent of using a "time machine" to look into the past to witness the early formation of galaxies, perhaps less than one billion years after the universe's birth in the Big Bang. Essentially a narrow, deep "core sample" of sky, the HDF is analogous to a geologic core sample of the Earth's crust. Just as a terrestrial core sample is a history of events, which took place as Earth's surface evolved, the HDF image contains information about the universe at many different stages in time. Unlike a geologic sample though, it is not clear what galaxies are nearby and therefore old, and what fraction are very distant and therefore existed when the universe was newborn.

The HDF has been intensively studied since its release. Ground based instruments with much greater aperture have obtained spectra of many of the objects in the HDF providing much needed information on distance and age. By recording images as faint as 30$^{th}$ magnitude, Hubble has provided a glimpse at what the universe was like over 10 billion years ago. In the image there are a few foreground stars from our own galaxy. These have the diffraction lines on them. In comparison with the sweep of cosmic history, the light-travel time from these stars is a brief instant. There are also a few brighter galaxies with the familiar spiral or elliptical shape representing the universe near its present age. The background shows numerous small, faint galaxies. Each speck recorded is a galaxy since we are looking past the foreground stars of our galaxy. These faint galaxies look peculiar because they are temporarily distorted by collisions with other galaxies. Many of the younger galaxies are small, oddly shaped, and immature.

Due to the unqualified success of the HDF in 1995, the Deep Field South was obtained in 1998 after the

installation of newer infrared and optical/ultraviolet cameras were installed during the second servicing mission in 1997. This revealed even fainter objects than the original deep field in 1995, providing another rich harvest of data on the early universe.

***Allen Whang***