nightwatch

Newsletter of the Pomona Valley Amateur Astronomers

Amateur astronomers just get better looking . . .

Janis Seaton

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President's ADDRESS

"Life is not a spectacle or a feast; it is a predicament."
George Santayana

I begin with a pang of angst - Deja Vu, if you will, encompassing a paltry ego's unwillingness to absorb it's now too obvious situation: leadership. However, my keening wail of forlorned dismay will not change the debacle before me. Thus I yeild to that which has been thrust upon my unworthiness. Before you I lay the baubles of my coalescing presidential thaughts and hope for the best.

I will try to get our esteemed assemblage another tour of Mount Palomar's marvelous telescope and a star party at a nearby location. Look for this occurring in the summer to early fall. Another project that has yet to bear fruit is the proposed tour of the Big Bear Solar Observatory. Once I have a date in hand I will let the membership know the details.

Bear with me for a few months while I try to re-establish my contacts with the astronomy club speaker circuit and we will get some very interesting persons talking to us in the near future. We will cover subjects as diverse as practical observing techniques to the deep space missions missions operated from JPL.

The summer months are filled with camaraderie and pleasant times under the stars. Your president cannot travel that far, so that even if there is a star party at pretty remote locations (Kennedy Meadows and such) I will be at far closer locations. This dichotomy of venue will serve the club membership well. While the purist can pursue the pristine skies of velvety darkness we who are unwilling to go that far can still enjoy the night time skies within a much more reasonable traveling schedule. We will use the newsletter and the meetings to hammer this agreement further.

One of the joys of an astronomy club is the sharing of insights, information, and attitudes amongst the members. I do need to know your interests and accomplishments so as to act more the president and less the master of ceremonies. There are many resources out there in the southern California astronomical communnity. I need to know the direction to go to make the club responsive to the memberships needs and dsires.

Now; below are a few events that are scheduled for the club's membership:
1. The next star party (5/15/99) will be at Yesterday's Ranch.
2. On (6/19/99) we will have another public star party. This will be at Jack's church. Please attend and make it a roaring success.

Roy Schmidt

PVAA Events Calendar

Month	Star Party	General Meeting	Board Meeting
May	**15**	7	21
June	12	4	25
July	10	2	23
August	14	27	6

General Meeting
April 3, 1999

Acting President Joe Hillberg opened the meeting by asking for guests to identify themselves; we had one guest, Victor Miller.

The immediate next order of business was a special election, to determine whether Roy Schmidt should be elected President to serve out the remainder of the current term. The answer was a resounding **yes!** with 100% of those present casting their ballots in favor of Roy. Roy was immediately installed as president, and took over the meeting at that point, to the evident relief of Joe Hillberg. Thank you, Joe! for doing the job you didn't want, and doing it well! And Welcome, Roy! We are happy to welcome you back as President! It's been too long!

Roy started things off by a drawing for the last copy of the 1999 Astronomy Calendar. The winner was based on the one making the closest guess to a number stored in Roy's mind. Does anyone suspect collusion, here? To show how profoundly this reporter was effected by the drama of this drawing... I forgot to note down who won the Calendar! Anyway, congratulations, Mr. or Mrs. winner, whoever you are!

What's Up?
What's up? was presented by... Roy Schmidt. Roy presented a map of the sky for April 17th, the day of our planned Star Party. Saturn will be the most visible object at twilight (we will be back on daylight saving time). Roy suggests that this will be a good time to look for the zodiacal light, since the angle is unusually favorable. Lots of galaxies are available, since the Leo-Coma-Virgo clusters will be high in the East at dusk, and therefore up most of the night.

Although Venus is most prominent, Mars is in opposition,showing a 16.2 arc-second disk. This is a good time to look for detail on Mars, if you are able to track at 200-250 power. Mars is now in retrograde, near Spica. If you're interested, spend some time every clear day looking at it, to get used to catching those brief moments of clarity when you really see detail.

The Constellation Roy featured is Auriga, the Charioteer. Being in the plane of the Milky Way, Auriga shows no galaxies. However, it makes up for it by having lots of good open clusters. The clusters (M objects) are easy to find, and satisfying for new astronomers. For you experienced guys--how many stars can you find in M37? Burnham's reports 300.

Capella, the brightest star in Auriga is a multiple star (3 doubles), and the sixth brightest star in the sky. The name means "she goat", and a triplet of stars just below Capella is called "The Kids". Epsilo Aurigae is an eclipsing binary, like Algol, but with a 27-year period.

Much controversy over the recent full moon, the seond in March. Was it blue? It depends on which definition you use. We won't go into that--you can read about it in Sky & Tel.

Speaker

Our Speaker of the evening was Roy Schmidt. Topic: Spectra.
"Spectra is light smeared across the frequencies..." That was our starting definition in Roy Schmidt's discussion of spectra. But, he quickly became more technical. It was Newton who discovered that white light actually consists of a range of colors, when he applied a prism to sunlight coming through a small hole, projecting the resultant image on a screen. The "smeared out" image of the sun displayed the same seven colors one sees in the rainbow. In 1801, this discovery was extended by William Herschel, who studied the solar spectrum using thermometers and discovered the greatest effect beyond the red end, thus discovering infrared radiation. Jo-

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Get the latest news on the star party, club meetings, special events and astronomy happenings.call 909/985-1684

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hann Wilhelm Ritter, doing a similar study with silver salts, later found the effect extending beyond the violet, thus discovering ultraviolet radiation.

In 1814, Joseph Fraunhofer repeated Newton's experiment substituting a narrow slit for the round hole, and a telescope for a screen. This way, he observed the continuous spectrum of the sun interrupted by hundreds of dark lines, now known as **Fraunhofer Lines**. Fraunhofer was a great experimental scientist, so he now extended his discovery by building a series of diffraction gratings, or series of parallel slits. With the gratings, he found a total of 550 lines in the solar spectrum.

Robert Kirchoff and Wilhelm Bunsen (of the Bunsen burner) started systematically comparing the lines in the solar spectrum with those in the flame or spark spectra of the purest elements available, thus identifying the chemical element responsible for each line or group of lines. By this method, they discovered two new elements, cesium and rubidium. By 1868 Anders Angstrom had measured the wavelengths of about 1,000 Fraunhofer lines and expressed them in units of 10×10^{-10} meters (later called the Angstrom), Spectroscopy had a fully-established scientific basis, needing only improvements in instrumentation and the development of photography.

There was much early discussion as to whether the Fraunhofer lines actually came from extraterrestrial bodies, or whether they came from stars. When they took spectra of bright stars, the spectra were different from the sun, indicating that the source of lines was the originating star. However, in 1836, Sir David Brewster found that some spectral lines changed with the height of the sun in the sky, indicating that those lines came from the atmosphere. The truth, of course, is that the lines reveal any elements in the path between the bright source and the spectroscope, both stellar and terrestrial atmosphere.
About 1860, Ramsey started photographing bright emission lines during solar eclipses. When the lines failed to match any known element, it was eventually found that he had discovered a new element, helium. Another new discovery came from Sir William Huggins in 1864. Looking at ionized light, the single line of an ionized gas, he thought he had another new element and named it Nebulium. However, it turned out to be due to an electron transition into a "forbidden zone", which turned out to be possible in thin gas clouds.

The sun emits a spectrum comparable to a "black body source"--that is a totally black chunk of metal, capable of easily absorbing (or emitting) heat. When heated To a wide range of temperatures, the body radiates a spectrum of a specific shape. This comparison makes it easier to identify the source of particular lines and intensities was see in stellar spectra.

With a gas between the hot source and the observer, some particular wavelengths will be absorbed by specific elements in the gas cloud, resulting in a dark absorption line, the Ballmer series. If you observe the hot gas with the hot source offset by 90 degrees, you see the bright lines emission spectra. You get a discrete line for each change of energy for each slice of the element involved.

Applying these findings to Astronomy, Secchi create a scheme based on spectra to classify stars. His system used Roman numerals. Pickering changed to letters, A, B, C. Eventually, Annie Jump Cannon, a "Computer" assigned to analyze plates of spectra, rearranged the sequence so that it corresponds to temperatures. This resulted in a new sequence, O, B, A, F, G, K, M, best learned by a somewhat sexist mnemonic.

Roy showed a sequence of pictures illustrating the technical points made in the technical part of his presentation. He showed that a grating provides a more uniform dispersion than a prism. He showed us the Huggins nebula (source of the bright emission lines). The Cat's Eye Nebula produces discrete emission lines, not a continuous spectrum, like a star.

That hotter the star, the fewer lines (most molecules are broken apart by heat). Cooler stars show more metals (elements beyond Helium (?).

The famous "Red Shift" was identified and measured by observing the shifted wavelength of identifiable spectra lines. The cause of the change of wavelength was determined to be the speed of recession of the light source. The doppler effect can be observed with rapidly spinning stars, such as pulsars, where the shift in wavelength of specific spectral lines from one side of the star to the other allows us to calculate the speed of rotation. The width, sharpness and intensity of spectral lines all reveal additional information to the trained observer.

Type "O" stars, such as Mintaka in Orion, are 30,000 to 50,000° K. The spectrum shows mostly Helium, very few metals, if any. "B" stars, such as Supernova 1987A, or Regulus, or Rigel, are about 9,700° K. They have strong Hydrogen lines.

The analysis continues through all the various categories, down the temperature range to "G" stars (our sun is G2), at 5,000° to 6,000° K. At this temperature, a number of molecules start to show up in the spectrum. Cooler "K" stars tend to be Red Giants, such as Aldeberan and Arcturus, at 3,500° to 5,000° K. They show lots of iron, chromium, and other metals and molecules.

"M" stars, such as Antares and Betelgeuse have temperatures

of around 2,500° K. These are giants that are pulsating, as their fuel supply approaches exhaustion. They have lots of molecules, due to the cooler temperatures.

How can I experiment with spectra? Rainbow Optics provides a kit for $200 that includes a grating and a cylindrical lens. Use it with about a 9 to 12 mm eyepiece. You rotate the lens until you can see the lines. The differences between "M" stars and "A" stars, for example, will be obvious to the eye. However, for more exact analyses, such as identifying specific spectral lines, you would have to have a tracking telescope, photographic equipment, and access to reference files of identified spectra. In short, you need a professional observatory.

Patrick Nicholson

APRIL VISIT TO YESTERDAY RANCH

I arrived at the ranch about 4:30 PM and it was a beautiful day. Going down the side road of the ranch, I found the shallow pond had grown longer but was only three inches deep. My blue Ford truck became a muddy gray color. There was a light cloud cover and the small lake was full of ducks, coots and large white herons.

I was setting up my telescope when Allen Hwang contacted me by CB radio and I told him how get to the ranch. I also told him that his wife was going blame me for his black Suburban becoming a muddy mess. Allen brought his friend David who has a great interest in Astronomy. After Allen arrived Bob Marvos, Ron Hoekwater and Lee Collins made their appearance.

Everyone was busy setting up their telescopes and getting ready for the night adventure. The light cloud cover remained until about two in the morning. Eventhough we had the light cloud cover the seeing conditions were not too bad. I tried using my CCD camera and found the conditions were not the best.

Allen brought his C-14, which performed beautifully. We had a great time visiting each other's telescope and making new friends. Patrick Nicholson told me that one of the most important events that should take place at a star party is to enjoy the heavens and each other company.

We woke up early in the morning and loaded the gear and some of us went to our favorite breakfast water hole.

Note! I think that you can avoid the water and mud by driving along the side of the existing road.

Owen Robbins

ACTIVITIES & CURIOSITIES

STAR PARTY: To be held at Yesterday's Ranch on the 15th of the month. You might spend some time viewing Mars and later in the evening catching some of the other planets. With the weather returning to milder temperatures during our evening viewing sessions, one should take these opportunities to Hone the observation skills to seek the dimmer members of the NGC catalog. Some of you will remember my vain efforts to find the globular cluster NGC 6749. I will let club members know that a well received viewers guide did proclaim that the cluster's presence could be detected with a 12.5" telescope. Even with Joe Hillberg's 18" telescope I didn't see the little devil.

I now have a new guide to deep sky objects that claims that the globular cluster is visible in a 12" to 14" telescope .... stay tuned.

OFF THE NET: Remember the presentation I gave last month on stellar spectra? There is a location on the net with instructions for building your own spectroscope. This isn't one that you can directly hook up to your telescope, but it will show you the fun you can have with this very important scientific device. Just follow the simple instructions, once you have purchased the diffraction grating, and you will be in business.

http://asd-www.larc.nasa.gov/edu_act/simple_spec.html

Roy Schmidt

ANNOUNCEMENT

The annual subscription rate for **Astronomy** magazine is **$29.**

The annual subscription rate for **Sky & Telescope** magazine is **$29.95.**

When you renew your subscriptions to these magazines, make the check out to "**PVAA**", and give the check to Jack Gardner.