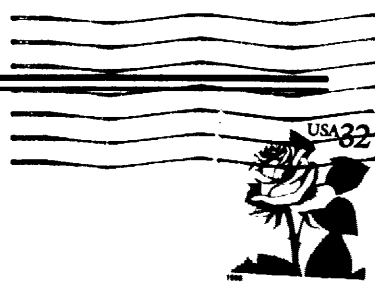


Amateur
astronomers
get better
looking...



John Seaton

President's Message

As I write this, the first two objects on the radar screen are the June General Meeting, and the June Star Party. Our own Ludd Trozpek is going to talk to us about 19th Century Astronomy. Think about it! Much of the astronomy of that period preceded astrophotography, spectrography, and nuclear theory--not to mention relativity! Visualize a period when observations were recorded by hand drawings, with visual readings of the setting circles, and the largest telescopes were reflectors with mirrors made from specular metal. You have to admire their results.

The second item is our upcoming joint Star Party with David Chandler's Springville Astronomy Club. It will be fun to meet these excited new astronomers, and to see Billie and David again! If the "June Gloom" holds off to give us clear skies, it should be a great event!

It's also Nomination time again, as we prepare for the August election. All offices are open, with the exception of two "hold-over" board members, whose function is to ensure reasonable continuity in the conduct of the club. We hope to have a competitive race for every other position, including President, so talk to your shy, but capable friends. We would love to see a lot of new faces on the board! But please, do not nominate someone, unless you have their consent! Nominations will be presented by the Board at the July meeting, and nominations from the floor will be accepted at the same meeting. The election will be at the August meeting.

Looking a little further ahead, your board has elected to return, yet again, to Kennedy Meadows for the July and August Star Parties. Excellent dark skies there more than offset the primitive camping conditions (nearest facilities 1/4

mile). This is always an enjoyable site.

September holds another special event: We are going to have a joint meeting with a motorhome camping group at Observatory Camp Ground, near Palomar. This is a well-organized group with lots of experience. They propose to go down early and hold sites for us near the grassy central meadow here we will set up our scopes. All they ask in return is that we give them a guided tour of the sky--something we all love to do! It should be a fun evening.

We hope and expect to wind up the PVAA fiscal year in fine style, ready to hand over the reins to a new group of officers on September 1. Let's all come out and enjoy the events. After all, the stars are only part of what makes PVAA fun--there's also the good fellowship!

Patrick Nicholson

PVAA Events Calendar

Month	Star Party	General Meeting	Board Meeting
June	20	12	5
July	25	10	3
August	22	14	7
September	19	11	4

June General Meeting

The June General Meeting was well-attended and packed with activity. President Patrick Nicholson appealed to members to consider standing for election as a Board member or officer for the 1997-1998 term, beginning September 1. We don't want the PVAA to become a Senior Citizen's Club! So, let's round up some new blood to add spice and enthusiasm to our leadership! All offices, except for the two hold-over Board members, are open for nominations from the floor at the July meeting.

What's Up was presented by Bob Branch, featuring Corvus and Capricornus. Bob drew upon his many years of experience as an astronomer to direct our attention to aspects of the sky we may tend to overlook. **Planets:** There are no evening planets, but Jupiter, Saturn Venus and the Moon all will be visible on June 20th, just before morning twilight. **Corvus**, sometimes called Spica's Spinnaker because of its shape, is a very old constellation with a number of interesting objects. NGC 4361 is a reasonably-bright planetary nebula at magnitude 10.5; it's easy to find, inside Corvus. Another item of interest to all of us is NGC 4038/39—a pair of interacting galaxies known as "The Antennae". The tidal "tails" that give the group their name probably won't be visible to most of us, but we should see a distorted galaxy that looks "strange". **Capricornus** includes that frustrating object, M30—frustrating because it is usually lost in morning twilight during a Messier Marathon! Take time to look at it now, when you have a better opportunity. While in Capricornus, take the opportunity to visit Uranus (just below the middle of the upper edge of the "bikini" shape. Neptune is off to the lower right. Both should be within the capability of most of our scopes. A good opportunity to visit a pair of elusive planets!

Auction. As advertised, we had a "silent auction" during this meeting, featuring a series of eyepieces, two videos, and a number of donated books. The auction went well, with all of the hardware being sold except for the expensive 55mm 2-inch Plossl eyepiece. Several books sold, increasing the net for the club to \$156. A welcome addition to our treasury!

Principal Speaker. The principal speaker for the evening was our own long-time member Ludd Trozpek, who shared with us his interest and enthusiasm for 19th century astronomy, and the wonderful books and charts that store that technology for our enjoyment. The 19th century was a period of poor instrumentation and inadequate technology—compared to our modern view—but its practitioners show formidable mathematics skill and outstanding observing and drawing capability. Imagine doing astronomy without the benefit of photography, recording visual observations only by drawings.

Ludd told his story through a series of overhead projections, showing actual pages out of books from his

collection. Examples include the: *Introduction to Spherics & Nautical Astronomy* by Kelly. What is nautical Astronomy? This is the use of astronomy to determine longitude. It is hard to realize that the Marine chronometer, developed by Harrison, only came into its own at the end of the 18th century (Harrison received the prize for its development in 1783). Lewis and Clark carried this book with them on their cross-country trek, in order to use its tables on lunar positions to determine longitude.

One of the more fascinating items was a painting of Louis 14th looking through a small refractor manually held by a person resembling the astronomer Cassini. One wonders what he saw, if anything! However, starting in the 17th century, astronomers were carefully observing transits of planets across the face of the sun—especially transits of Venus. Such measurements, if made at the same time from widely-separated locations enable one to calculate the distance to the sun (the astronomical unit), and thus, through Kepler's laws, to determine the distance of all the planets, and the size of the solar system. Ludd showed drawings indicating measurements of such a transit, giving us an appreciation both of the difficulty, and of the high quality of their draftsmanship.

The earliest Star Atlases seemed to feature the drawings of the mythical creatures and gods representing the constellation, with the few scattered stars depicted on their bodies indirectly relating to the actual view of the sky. The 17th & 18th-century Star Atlases were making a gradual transition away from the fanciful drawings in the earliest examples to toned down versions such as White's *Coelestial Atlas*, which showed outline drawings of the creatures with some color toning, on through progressively-simpler draw-

PVAA Officers and Board

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Treasurer.....	Jack Gardner.....	909/626-2665
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Board

Ron Hoekwater.....	909/391/1943
Ray Magdziarz.....	909/626-8303
Dorene Hopkins.....	909/983-5584
Bob Branch.....	909/982-8015

Directors

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ings of the constellations all the way to the largely-unadorned pages of the *Neue Uranometrie* by Argelander, published in 1843. In 1900, the Atlas published by Garrett Service added the names of the brighter stars, and the Greek letters identifying the stars making up the constellations.

In 1845, the Bedford Catalog broke new ground by including many careful sketches of deep-sky objects. Astronomers had developed an interest in the "Nebulae"—even though they didn't know what they were. Eastman developed the photographic plate with an emulsion suitable for astrophotography in 1880. In 1892, the *Atlas of Astronomy* by Ball began to include photographs, as well as star names and Flamsteed numbers on facing pages. Probably the best 19th century work on Nebulae was a map on the distribution of the nebulae by Proctor, in 1880. The interest was there, but it took the development of the Mount Wilson 60-inch telescope at the end of the century to resolve the issue of what the Nebulae were—a task culminated by Edwin Hubble's studies, using the Mount Wilson 100-inch and the Palomar 200-inch telescopes. The new era had begun.

Patrick Nicholson

PVAA 24 HR. Hotline...

Get the latest news on the star party, club meetings, special events and astronomy happenings.

call 909/985-1684

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Our Astronomical Revolution

The recent talk by Ludd Trozpek on Nineteenth Century Astronomy brought home to many of us how lucky we are to live the Twentieth: We can benefit from the great revolution in astronomy that has occurred during this century. Let's explore the significant breakthroughs.

The Spectrograph. The development of the Spectrograph, the wedding of the Spectroscope to photography, was arguably one of the greatest advances in instrumentation ever made in the field of astronomy. Think of it! For the first time, by comparing the spectrogram of stars to spectrograms of earth-bound materials heated to appropriate temperatures, a whole range of information became available: the basic temperature of the star, the mixture of gasses that produce the star's glow, the proper motion of the star, the discovery and calculation of orbit of binary stars. The list goes on. As some of you may remember, helium was first discovered in the spectrum of the sun! It was through the Spectrograph that Annie Jump Cannon was able to develop the spectral classification of stars, which lead in turn to the development of the

Hertzsprung-Russell diagram of stellar magnitude Vs spectral classes.

Nuclear Theory. About the time of the First World War, a small cadre of scientists, notably including Niels Bohr, were developing sub-atomic theory. These studies, combined with the Spectrograph and the Cloud Chamber (which showed the track of subatomic) led eventually to the understanding that the glow of stars is fueled by Nuclear fusion. This breakthrough then led to our fundamental understanding of the life-cycle of stars, and their ultimate death as either a quiet white dwarf or spectacular supernova. Our century has been notably lacking in visible supernovae within our own galaxy, but supernova 1987A in the neighboring Large Magellanic Cloud confirmed most of the theories, while raising other questions.

Relativity. Einstein's contribution of the Theory of Relativity provided the refinements needed to reconcile the predictions of Newton's element laws of gravitation with the findings of increasingly-accurate observational astronomy. The deviation in the orbit of mercury was explained completely and exactly, proving the accuracy of Einstein's insight. Relativity, in turn, led to an understanding of gravitational lensing, since proven to be a valuable tool for the investigation into the farther reaches of space.

The Great Observatories. The development of vacuum deposition of thin films of metal on glass in the late 19th century led directly to the great observatories: the 60-inch and 100-inch telescopes on Mt. Wilson, the 120-inch Lick Observatory on Mt. Hamilton, and the 200-inch Palomar observatory. These great telescopes extended the limits of observational astronomy to the limits imposed by instabilities in the atmosphere. Finally, during the last decade, the Hubble Space Telescope has escaped the detrimental effects of the atmosphere and extended its reach to the very edge of the universe.

Radio Telescopes. The crude maps made by the first radio telescopes have been extended and refined, first by larger antennae, then by the use of interferometry. The large arrays and the Very Long Baseline Interferometer have increased the resolution of radio astronomy until it exceeds that of earth-based optical astronomy. In addition, the extended wavelength provided by radio telescopes provides a view of phenomenon, such as incredible supersonic jets whose presence was never suspected, based on optical astronomy.

The Outlook. Space-based telescopes, initiated by the Hubble, now includes a number of space observatories capable of detecting other, hitherto-invisible spectra, so that it is now possible to observe the same phenomena at all wavelengths, from the low-frequency radio all the way to Gamma rays. As usual, every new instrument resolves some questions, but then poses new ones, never imagined before. There are hints that we are reaching the limits of the observable universe, viewing phenomena dating from just a billion years or so after the Big Bang. What we find there? Some answers—and a lot more questions! It's an exciting time to be alive!