nightwatch
Newsletter of the Pomona Valley Amateur Astronomers

Knowledge is an unending adventure
at the edge of uncertainty.
Jacob Bronowski

Volume 31 Number 07 ***nightwatch*** **July 2011**

President's Message

Last Friday, July 8, I ate my breakfast in front of the TV, watching the last launch of the space shuttle with my 6-year-old son.

My feelings about it were, and are, complex. When I was 6 years old, everyone in my elementary school was pulled out of class for an assembly to watch the first flight of the space shuttle. We had read about it in our Weekly Readers (an in-classroom newspaper) so we knew what the space shuttle was, in the mundane sense. But we were all too young to know what it represented. I remember the teachers being very excited, some of them almost giddy, others moved to tears. I didn't know what any of it meant—that after a hiatus of several years, America had a manned space program again.

Many commentators have pointed out that manned spaceflight developed exactly backwards from the predictions of Werner von Braun and Willy Ley, who had posited reusable manned space vehicles first, then space stations, then manned flights to the moon. In fact, counting from the first manned flights in 1961, we got to the moon in 8 years, had space stations within 10 (the Soviet Salyut 1 in 1971, Skylab in 1973), and launched the first reusable spaceplane in 20. For the last 30 years—60% of the space age—America has only had the shuttle.

I am not a shuttle hater. In terms of contributions to human knowledge and the human spirit, I personally think the entire shuttle program could be justified for the launch and servicing of the Hubble Space Telescope alone. And whatever else the shuttle program has done, there has been a continuous human presence in space for the last 10 years and 250-odd days, aboard the ISS. These are big achievements. They might not be as viscerally exciting as moon shots, but they are major steps toward learning to live and work in space over the long haul—the same hard hat, lunch pail mentality of human spaceflight that was the impetus for the shuttle program in the first place.

On the other hand, people are more easily motivated by big dreams and grand gestures, and I suspect that a lot of people, looking back, would trade the whole shuttle program for a continuation of the Apollo program. We got to the moon in 8 years, landed there 6 times in 3 years, and have spent the last 39 years in low Earth orbit. Critics point out that all of the raw material for the ISS could have been launched by a handful of Saturn Vs, and assembled by subsequent shuttle flights.

They bring up a good point: for most of the past 50 years, our only option for getting even a single person into space has usually been our biggest (and therefore most expensive) available launch vehicle. The closest we have come to having a dual-track system—one for heavy cargo, one for delivering astronauts—is the coexistence of the Saturn V and Saturn Ib during the Apollo and Skylab programs, which would have been echoed by the Ares V and Ares I of the now-canceled Constellation program.

Where do we go from here? For the time being, NASA is putting all of its manned spaceflight eggs in the private industry basket. This may not be a bad thing. It is easy to forget that all our manned space vehicles have been operated by the government but built by civilians. And the space program was always going to have to leave the government-only cradle someday; apparently that time is now. In the short term, the loss of the shuttle means that the rest of NASA's programs get a boost. The budget for deep space probes alone is up by almost 600% (to just under 1 billion)—in the next few years there will be probes to Mars and Jupiter that simply would not have been funded if the shuttle program had continued. Again, these may not be as exciting as moon shots, but the Voyager missions, Cassini, and the Mars rovers have also been huge successes for our fledgling species, and their impacts on the human spirit are likewise hard to calculate.

How Does It Work?

This is the third installment in our look at the history and design features of eyepieces. In the second installment we showed how the Kellner and Plossl designs resulted 250 years after Galileo made his first telescope 400 years ago.

In 1880, just 20 years after Plossl announced his design, Ernst Abbe used a triplet for the first element and a single plano convex lens for the second. This design was noted for lack of distortion and more eye relief. It sacrificed the apparent FOV to 40 to 45 degrees. Another name for this design is the "Orthscopic" due to the lack of distortion. It is still used, especially in lunar and planetary viewing.

Next in history, 1883, came the Monocentric eyepiece. Here a center thick lens of flint glass appears to be a section of a marble. It is strongly curved. Two thin lenses made of crown glass are cemented to the front and back. The result is a thick lens triplet which has all surfaces such that they have the same center of curvature - hence the monocentric name. It has a narrow apparent FOV but high contrast and no ghost images. It was especially popular before anti-reflection coatings were available.

In 1915 Albert Konig improved the Abbe (Orthoscopic) and Plossl designs by replacing the triplet by a positive concave convex doublet and using a convex flat singlet for the second element. It only required three elements instead of four and provided a much improved eye relief. It has a comfortable 55 degree apparent FOV.

In 1921 Heinrich Erfle developed a 5 element design which used a doublet – singlet – doublet combination. They have problems with astigmatism and can produce ghost images. They are used for longer focal lengths. At 20 mm they are adequate and at 40 mm they can be quite good. They have large exit pupils, good eye relief and an apparent FOV of about 60 degrees.

The RKE design deserves some mention in the list of historical designs. Dr David Rank developed this design for marketing through Edmund Scientific in the 1960s and early 1970s. It uses three elements as an adaptation of the Kellner design. The first lens is a concave convex doublet achromatic field lens. The second is a simple convex convex eye lens.

This has been a summary of the eyepiece design development which required a lot of hand calculations and hand polishing of optical glass. Computer aided designs and computer driven polishing machines have changed the way eyepieces are designed and manufactured today. And yet we still see many of the same designs offered in our current catalogues.

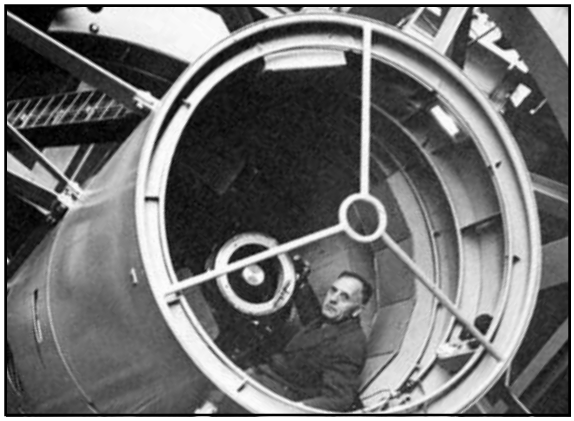
Expired patents and ease of manufacturing make these designs among the lowest cost. But sometimes we want a little more. In the next installment we will look at the Nagler design (Albert Nagler, patented 1979) and others which offer superior performance.

Ken Crowder

President's Message Continued

And where does all of this leave us as amateur astronomers? I think it makes it more important than ever that we hit the star parties, schools, and streets with our telescopes, and remind people that there is a lot up there to be experienced, that exploring space is not just the province of NASA, that it can be done by anyone with a little curiosity. In a sense, we are the space program for the communities that we serve. Let's keep them looking up. .

Matt Wedel



Club Events Calendar

July 15 – General Meeting

Join us to hear from Robert K. Buchheim, author of the book "The Sky is Your Laboratory"

Learn the many ways that the backyard observer can contribute to real astronomical science.

July 30 - Star Party - White Mountain

August 4 - Board Meeting, 6:15
August 5 - Columbia Memorial Space Center, 7:00-9:30 PM
August 5 - Girl Scout Star Party - Skyland Ranch
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 17-18 PATS - Pasadena Convention Center
September 24 - Mt. Wilson Observing

October 8 International Observe the Moon Night, Claremont
October 14 – General Meeting

December 9 - Holiday Party - 7pm at Sizzlin Skillets Upland

July General Meeting

PVAA President Mathew Wedel started the meeting even closer to the official 7:30pm start time than last month. Now we are going to have to start showing up early not to miss anything. He reminded us of some upcoming events, (which you can check out in the calendar section, or on-line); ending with the Mount Wilson Observatory night scheduled for the Saturday, September 24th. If you are interested, and haven't signed up, please contact Ron Hoekwater. By the way, in case you didn't know it, Mathew has a web site:

http://10minuteastronomy.wordpress.com/

which is worth checking out.

I'm always amazed on the little known facts that Lee Collins comes up with during his presentation of What's Up. It really makes the meeting.

Our speaker for the night was Alex McConahay, and the subject for the night was *"Through Rose Colored Glasses"* Alex is a past president of the Riverside Astronomical Society, (RAS), and helps organize PATS (Pacific Astronomy and Telescope Show) and RTMC Astronomy Expo (Riverside Telescope Makers Conference). Alex gave a power point presentation showing several shots of the same celestial object using different colored filters, and wide-band, medium-band and narrow-band filters. The object is not to just go and use just one filter on Mars just because a book or catalog said that Mars, or whatever object you are looking at, looks the "best" using that one. Be bold, try them all. You don't need to screw them in on the bottom of the eyepiece. Instead hold them over the eyepiece, then, if it really makes the object 'pop', - that's when you invest the time to screw it into the eyepiece for some serious viewing. One thing to remember is that a filter is just that – it filters some light that you would otherwise see, therefore making the image dimmer. Alex has a web site that is worth checking out:

http://www.alexastro.com/index.html

Also RAS put out a YouTube video about Alex:

http://www.youtube.com/watch?v=K-FPkVBhPAo

– which is good for a few laughs at his expense.

On another note:

Ray Magdziarz and Gary Thompson represented PVAA at the Columbia Memorial Space Center in Downey on June 10th. Several astronomers from LA and Orange County were also there. One brought a solar telescope. We saw several sunspots and some really large solar prominences. Before the sun went down we looked at the moon and got our scopes ready for the night. Ray brought a finder scope for the Center's Dobsonian telescope & installed it by drilling holes in their tube. It all came together great. Unfortunately just as the sky darkened, the clouds rolled in. We got to view the moon occasionally. If you have never been to the Space Center, it is really worth the trip, especially if it is a launch day. They have a REALLY BIG TV.

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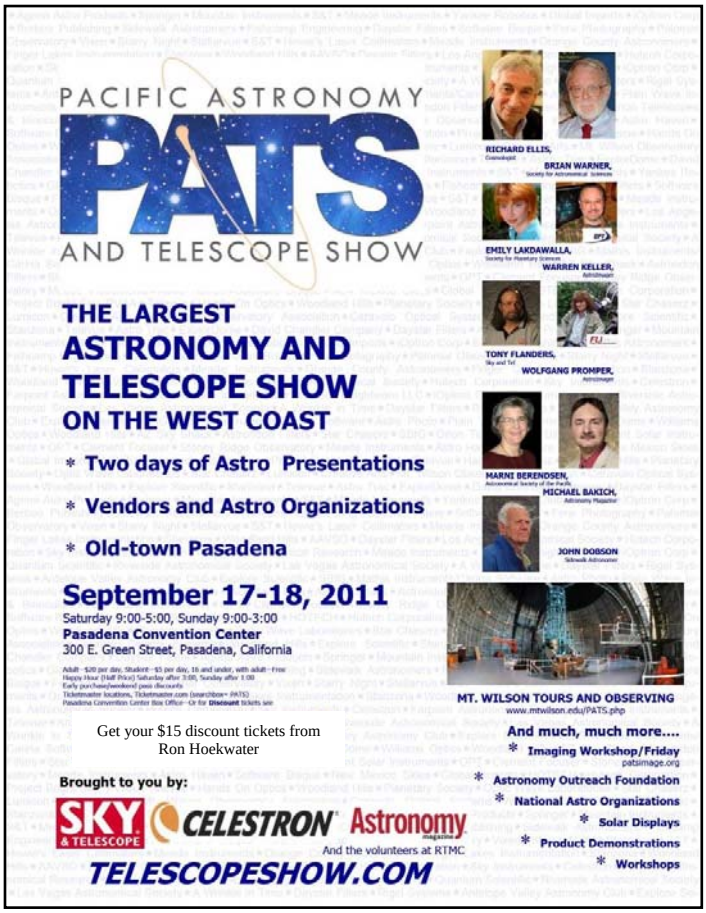
Gary Thompson



Get your $15 discount tickets for PATS from Ron Hoekwater at the next meeting.

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What's Up - A Battle On The Border

This battle is between Centaurus (Centaur) and Lupus (Wolf). Mythically the Centaur is trying to kill the wolf for a sacrifice. This interlocks their stars into one of the largest of combo-constellations. But being right on our horizon we can't see it all without going south of California's border. It's a battle for stargazers to see deep sky objects horizon close.

Two unique objects that rise briefly into our view lie in Centaurus. Both are too far south to have been catalogued by Messier and so have odd names. One is a globular cluster so bright it was originally classified as a fuzzy star. So it's called Omega Centauri (NGC 5139). In 1677, Edmond Halley was the first to suspect it was a very large globular cluster. Recently, a black hole has been detected at its center. This might indicate that it was once an even larger object, like a satellite galaxy that was stripped of stars by the Milky Way leaving only its dense core behind. Perhaps this is why it's the largest of all globular clusters in our Milky Way sky.

Nearby is another strangely named object, Centaurus A (pictured). It's a galaxy (NGC 5128) commonly called by its radio telescope classification. Much of its radiation is thought to come from a black hole at its core. Perhaps it's another example of the ongoing merger of two galaxies producing a disturbing combination of cores. It seems to be a thin spiral galaxy being devoured edgewise by a larger spherical galaxy.

But the bright stars in this area remain just below our horizon. They are Alpha Centauri, Beta Centauri, Acrux, Becrux, and Gacrux. In no other part of our sky are five first magnitude so close together. They represent the two feet of the Centauri and three stars in Crux (Southern Cross). They are a circumpolar grouping commonly visible in the southern sky. They are the South Polar equivalent of the North Polar "Big Dipper" So while the Big Dipper appears on the flag of Alaska, the Southern Cross (and sometimes the Centaurus stars) appear on five national flags. These are Australia, New Zealand, Brazil, Papua-New Guinea, and Samoa.

When I was recently in our southern most state Hawaii, I eagerly went out at midnight to view it. What impressed me most was the brightness of Alpha Centauri. Well, it's the third brightest star in the sky (after Sirius and Canopus), and the closest star to our Sun giving it the largest proper motion. It's 4.34 light years distant, about 25 trillion miles. It was one of the first stellar parallaxes measured in 1834. It's a triple system, two sun sized binary stars revolve in an orbit of 80 years. Of interest is a third star, a 15th magnitude red dwarf which orbits very far out and so is actually the closest star to our sun. It's Proxima Centauri, meaning "approximately the closest."

Alpha Centauri is also called Rigel Kentaurus (Centaur's foot). Close by is the Centauri's other foot, Beta Centauri, also called Hadar. Hadar is ancient Arabic for companion or side-kick. Something of an insult since it's a giant compared to Alpha. It's 490 light years away, the 10th brightest star.

Crux is the smallest and most religious of all constellations. But it has no center star, its more of a southern kite. Early Arab cartographers saw the Crux stars as the hind feet of Centaurus. But when Spanish and Portuguese explorers bravely sailed into unknown southern seas they were overjoyed to see their holy cross in the sky. And its longer central bar pointed toward the starless South Pole.

Acrux is also binary star and the 12th brightest. Becrux (19th brightest) is also called Mimosa. This mysterious name was invented by the German chart maker Johann Bayer. It means mime in German, but perhaps it refers of its bluish-white color which matches the flowers of some Mimosa trees. Just recently it was discovered that Becrux has a tiny close-in companion hidden the glare of its primary star. The little Southern Cross also has a bright star cluster, The Jewel Box, and a Milky Way obscuring cloud called The Coal Sack. A lot for the smallest constellation.

Going north into our California sky we find, in Hydra, the galaxy M83. Called the Southern Pinwheel or Seashell it has had several supernova, including one in 1968 which was 100 million times brighter than our Sun.

Over in Scorpius (Scorpion) is the easiest to find globular cluster M4. It's right next to red Antares (rival to Mars) the16th brightest star. Just above it is another good globular, M80.

So there are remarkable deep sky objects to do visual battle with in this border area, although they can be much better appreciated in Australia.

Lee Collins

PVAA Membership Renewal for September 1, 2011 to August 31, 2012

_____ $30 - Individual Membership
_____ $40 – Family Membership
_____ $12 – Student Under age 18 Membership

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Thank you for your continued membership!