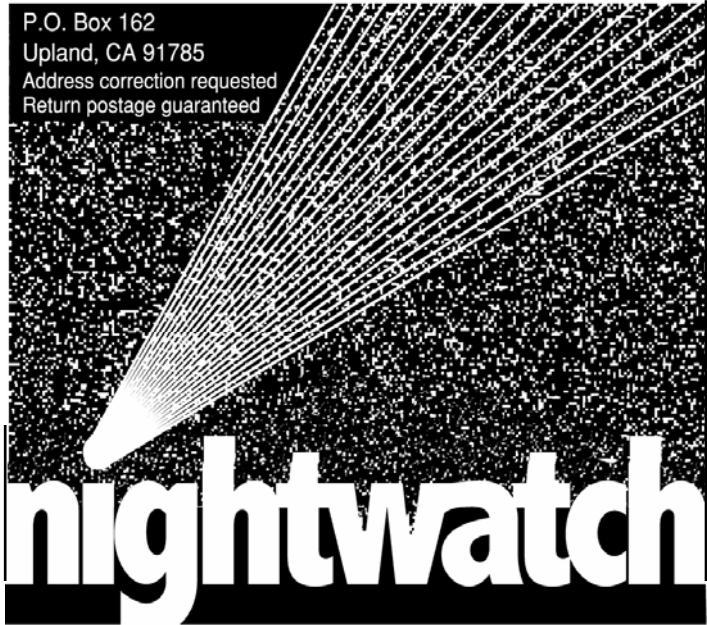


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Newsletter of the Pomona Valley Amateur Astronomers

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Volume 23 Number 6

nightwatch

June 2003

President's Message

On Memorial Day weekend, up at RTMC, I picked up a used copy of *The Periodic Kingdom: A Journey into the Land of the Chemical Elements* by P. W. Atkins. In this entertaining book the author treats the Periodic Table of Elements as if it were the map of a physical place and draws comparisons between the groups, periods, and individual elements and the terrain features of an imaginary kingdom. In this ingenious analogy Atkins also explores the history and governing institutions of the kingdom, demonstrating how a knowledge of the Periodic Table can lead one to a greater understanding of the properties of the chemical elements and of the similarities and differences between elements. And he writes about the *cosmic* origins of the elements! This leads to the following line of thought.

All of the naturally occurring elements (except Hydrogen, Helium, and Lithium, which originally came into existence after the Big Bang) were created within stars. We are all made of "star stuff" and all of the atoms in our bodies roamed the Universe for eons before becoming part of us. According to other sources that I have read, there is a continuous turnover in our bodies, with atoms constantly exiting to be replaced by others. In any case, one way or another, our atoms will, sooner or later, return to the Universe at large.

If this all seems a little too Hermetic, we are also all sojourners of the Universe in another, more tangible sense. We travel through the solar system at a speed of about 66,000 miles per hour on a big (by human standards), damp spaceship that we call Earth. Our own blue spaceship accompanies our own star, the Sun on its long journey around the Milky Way Galaxy, while it, along with millions of other galaxies, wanders the unimaginable vastness of the Cosmos.

So, when we study and enjoy and learn about this

fascinating hobby (astronomy) we are studying our own origins, we are enjoying the voyage which we are on, we are learning about our destiny. What better use of our leisure time could we find than that?
Ron Hoekwater

Mount Wilson Mars Trip

On Wednesday, September 3rd, PVAA will be on Mount Wilson observing Mars with the 60-inch telescope. If you wish to be there, in the dome with this historic instrument, for the closest approach of Mars in tens of thousands of years, act now. Mail a check (\$60 for members, \$75 for non-members) to the club's PO box. Or you may make payment personally to our treasurer, Ludd Trozpek. Only the first 25 to pay will be going. Mount Wilson does not allow more than 25 guests in the dome. Don't be left out. Sign up early.

PVAA Events Calendar

Month	Star Party	General Meeting	Board Meeting
June	28	13	5
July	26	11	3
August	23	8	July 31
September	27	12	5

Why Doesn't Mars Come Around More Often?

The Apparent Motions of Certain Stars and of the Outer Planets

With Respect to the Sun, As Seen From Earth

PART II

Now I will shift the discussion from stars to outer planets. The more distant of the outer planets move only very slowly with respect to the fixed stars. Their diurnal motion across the sky occurs at a rate very close to the sidereal rate. All the outer planets move only very slowly with respect to the fixed stars. All the outer planets exhibit apparent retrograde motion, relative to the fixed stars, around the time of opposition. The more distant the planet is, the more significant is the contribution of the retrograde motion to its total apparent motion. Retrograde motion is cancelled out over time by compensatory accelerated prograde motion. So retrograde motion makes no net contribution, over time, to the overall apparent motion of the planet against the starry background. Therefore, I will ignore retrograde motion for the rest of this discussion.

Even Saturn, only the sixth planet from the sun, which takes about 30 years (360 months) to complete one revolution, moves at a rate that is essentially the same as that of the stars. With respect to the stars, the sun moves eastward one degree per day and Saturn moves eastward an average of one degree per month. So Saturn's motion relative to the stars is only 1/30 as fast as the sun's, and Saturn's motion relative to the sun, to a first approximation, can be considered to be the same speed as that of the stars.

So the yearly cycle of the more distant outer planets, Saturn, Uranus, Neptune, and Pluto is very, very similar (practically identical) to that which I have described on the preceding pages for mid-declination stars. They emerge from the west side of the sun, continue to move westward away from the sun at an average speed of one degree per day, pass through opposition from the morning sky into the evening sky, continue on westward to approach the sun from its east, finally rejoining the sun after one year and disappearing into the sunset. For Saturn, the only difference is that the dates of the conjunction, heliacal rising, and opposition would drift about two weeks later each year, while for a star they would remain constant.

For Uranus, Neptune, and Pluto, the amount of yearly drift of the date of opposition, etc. would be significantly less than that of Saturn. They would behave even more like the stars, although the relative effect of retrograde motion would be greater than for Saturn.

Now let us consider Mars, the innermost of the outer planets. It moves in its orbit at a greater velocity than the other outer planets and its orbital path is shorter, so its motion in the sky differs substantially from the sidereal rate. With respect to

the stars, it does not move as fast as the sun (one degree eastward per day), but does move slightly more than half as fast as the sun, much faster than Saturn and the others. Conversely, with respect to the sun, Mars moves slightly less than half as fast as the stars, at an average speed of a little less than one-half degree per day to the west, while Saturn, Uranus, Neptune, and Pluto and the stars all move about one degree per day.

This is because the apparent motion of the sun relative to the stars is produced by the revolution of the earth around the sun, with an orbital period of one year, or about one degree per day. Most of the apparent motion of Mars with respect to the stars (except for the retrograde loop around the time of opposition, which we will ignore) is produced by the revolution of Mars in its orbit around the sun, which takes almost two years to complete, amounting to slightly more than one-half degree per day.

So unlike the stars and the more distant outer planets, Mars moves away from the sun more slowly, only one-half degree per day. It takes Mars more than a year, not the usual six

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months, to go from conjunction to opposition. Then, to go from opposition back to the next conjunction with the sun, instead of six months, this also takes more than a year. So for Mars the full cycle, from one conjunction to the next, or from one opposition to the next, takes a little more than two years, whereas for Saturn and the others it takes only about one year.

Mars climbs very slowly away from the rising sun toward opposition, and then after opposition it falls back toward the setting sun also very slowly before it is finally swallowed up. We are accustomed to one-year cycles in the sky. Mars takes two years, and that is unusual to us.

Instead of passively allowing the sun to race away from it to the east, like the others do, Mars chases after it, unsuccessfully, but fast enough to delay the inevitable. The others allow the sun to race away from them, and as it does, they seem themselves to race away from it to the west, following a quick one-year cycle imposed on them by the sun (but really secretly imposed by the earth). Mars resists, chases the sun, and cuts in half the speed at which the sun leaves it, thus cutting in half the speed at which it seems to leave the sun. This half-speed separation prolongs by two-fold the length of time required for Mars to circle around the sky and re-join the sun from the east, or the time for Mars to go from one opposition to the next. We get to observe the rest of the outer planets every year, at opposition, when they are closest and largest and we can see them best. But Mars is rare and special. It is more of a treat when Mars comes to opposition. Most of the time Mars is too distant and tiny to be worth observing. But once every two years, when we have gotten hungry to see it again, Mars comes back to opposition and satisfies our hunger.

Finally I will mention Jupiter. Its orbit is intermediate between that of Mars and Saturn and so is the way it behaves in the sky. Jupiter takes a little less than 12 years to complete one orbit around the sun, compared to thirty years for Saturn and about 2 years for Mars. With respect to the stars, Saturn moves an average of about one degree per month, Jupiter moves about 2 ½ degrees per month, and the sun moves about 30 degrees per month (i.e. one degree per day). The diurnal motion of both Saturn and Jupiter across the sky is very near the sidereal rate, and quite different from the solar rate. These two planets both stick pretty tightly with the stars, but Jupiter drifts away from the stars a little faster than Saturn does. Still, Jupiter behaves much more like Saturn than it does like Mars, which moves eastward from the stars at an average speed of about 16 degrees per month.

Since Jupiter is moving only slowly with respect to the stars, it is moving along with them rapidly away from the sun, westward at about 27 degrees per month. This is only a little slower than the stars themselves are moving away from the sun (30 degrees/month). So along with Saturn and the more distant outer planets, Jupiter behaves more like the stars, completing its cycle in about a year (actually 13 months). The date of its opposition drifts later each cycle, but only by

about one month. We are able to observe Jupiter at opposition every year (or almost every year). This is like Saturn, Uranus, Neptune, and Pluto, but unlike Mars.

The apparent motions of the heavenly bodies with respect to each other through the seasons and the years seem complex, yet they are based upon the simple true motions of these bodies, as seen from our moving, spinning platform, earth. If we are able to think about this subject in a clear and simple manner, we can understand how the true motions give rise to the apparent motions.

This is the conclusion of a two part article by *Jeff Felton*. Part one was in the May edition of Nightwatch.

May Star Party

In the month of May, PVAA was to be found at a star party site, which hadn't seen us for a few years. That is the Angelus Oaks site, about a mile off of Highway 38. Cow Canyon Saddle is still (as far as I know) closed to us so we chose this, a comparable site.

The location of the star party is a hilltop, which was cleared and leveled to make a landing area for helicopters. It is reached by means of a dirt road, out of the village of Angelus Oaks. I had checked the status of this road several months earlier and it was in the best condition that I had ever seen it. This however was before the rain that we received in April. On May 31st (star party night) it was in the worst shape that I had ever seen it. However, it was still passable, but I wouldn't advise it in a vehicle with low ground clearance.

Angelus Oaks is about as dark as Cow Canyon Saddle and it has much better horizons. The only horizon with any significant amount of obstruction is to the east. Angelus Oaks is farther away than Cow Canyon Saddle, but it is much closer (about a one hour drive) than just about any other site that we regularly visit. Mosquitoes were an unpleasant, but not an unbearable problem for much of the night.

The May star party was attended by soon-to-be-members, Joe and Leah Rubinstein, their friends Dan and Bianca Chadwick, Joe Hillberg, Bob Akers and myself. Probably, the proximity in time to RTMC kept some away. (Too much fun for only one month) Joe and Leah brought their new Meade refractor, Joe brought his old 10-inch Dob, Bob brought his recently (RTMC) acquired 90mm refractor (in his new vehicle), and I brought my Starspitter.

We started off looking at Jupiter right after sunset, before it was even dark. After the end of twilight we went after some of the fainter (and in some cases a little tougher) objects. On this particular night there was fog in the valley below, yielding darker than normal skies. No one was

complaining. We looked at the Messier objects that everyone looks at this time of year. We looked at the Cat's Eye Nebula (NGC 6543). This is a breathtaking object, for any of you that have seen it, in the 60-inch telescope on Mount Wilson. I am not going to spend a lot of time writing about the deep sky objects that we observed because the highlight of the morning was the Mars.

At about 3:00 AM the "GOD of War" was getting out of the trees and rising well above the mountain. He was a bright, orange orb invading the sky from the east. At this point only Bob and I still persevered and both our telescopes spent the remainder of the time on Mars. During moments of steadier seeing, we could see a fair amount of surface detail. I am still looking for a good image of the face that Mars was showing us at that hour for comparison to a drawing that I made.

After sunrise, with the mosquitoes lending encouragement we quickly packed up and headed down the hill. In Redlands we stopped at a little restaurant for a wholesome breakfast (hoping to replenish our somewhat depleted hemoglobin counts) and then departed for home. (Please realize that I'm exaggerating a little about the mosquitoes.)

The next star party is on June 28th at Cottonwood Springs. (No mosquitoes there.) The nighttime temperature at Cottonwood is very comfortable this time of year. I hope many of you can be there.

Ron Hoekwater

Astronomy Expo

(Riverside Telescope Makers Conference)

This year's Astronomy Expo (formerly the Riverside Telescope Makers Conference) was (as always) 3 days and nights of continuous astronomical activities. It was reported that more than 1700 attended this, the 35th conference. This was my 10th year in attendance, but many there have been attending for more than 20 years and at least one person has attended all 35 of the annual gatherings.

This year's theme was "Building your own Observatory" and as always there were many interesting and entertaining lectures on this and other topics. Among those speaking on the construction of home observatories was Rick Fienberg, editor in chief of *Sky & Telescope*. He told of eight observatories (including his own) that were built by staff members of *Sky & Tel*.

Every year Ludd Trozpek arrives at Camp Oakes early and saves one of the prime camping areas for PVAA. This year Bob Akers, Joe Hillberg, Larry Pall, and myself were all camped in the area that Ludd had staked out for us. I also saw David Kary, Owen Robbins, and Allen Wong (with his family) out and about but I'm sure that some PVAA members managed to attend without being seen by me.

Part of the RTMC fun is visiting the vendors and shopping for bargains. Both Bob and Larry ended up going home with new refractors. Joe and Ludd parted with a few

odds and ends at the Saturday morning swap meet and I purchased several used books and new tee shirts. Everyone seemed pleased with the deals made, whether they were acquisitions or sales.

This year the lunar phase favored observing on Memorial Day weekend. The moon did not rise until well after midnight. Friday night started off with thin clouds. These left and returned a few times before finally departing for good after midnight. Saturday night the sky was beautiful from evening twilight until morning's dawn. Sunday evening was similar to Friday.

As always, I had a great time. If you have never attended this 3-day weekend of nonstop astronomy, then keep Memorial Day weekend 2004 open and make plans to be there next year.

Ron Hoekwater

Adventure at Angeles Oaks

I had completed all of the pressing matters required of me by 5pm Sat. and then debated with myself about going to Angeles Oaks so late in the day. I thought that I'd surely arrive in the dark, not such a good thing to do at a star party. But on the other hand the image of our President...Ron, squinting into an eyepiece from the top of a wobbly ladder, muttering to himself, while being stalked on all sides by Black Bears and Mountain Lions, all playing out on the top of a distant dark mountain top- made me feel guilty. At the very least, if Ron was mauled, leaving his crumpled crimson form and outstretched arm only inches from his Nagler eyepieces- someone would have to assist in hauling his 22" Starsplitter and other equipment away. Hang on "Starsplitter", help is on the way!

About 80 mins later I found myself on the truck trail above the Angeles Oaks Post Office. Several portions of this road were treacherous, due to large ruts and rocks. Low ground clearance/ standard vehicles would be unwise to attempt this passage. I was only able to gain the top by driving over what appeared to be the roof of an entirely sunken Subaru, which fit perfectly into one of the ruts / sink holes in the road. Once the plateau was gained, I was surprised to see a number of vehicles- mostly trucks or SUVs.

While setting up, I learned that several visitors, their daughters, Joe Hillburg and Ron Hoekwater were in attendance. The June gloom was starting to roll in and was acting as an excellent light baffle, resulting in reasonably dark skies to those above. I was anxious to try out my used 90mm Meade, purchased at RTMC. Although seeing was not that great at times, I was able to split Lyra's double- double (Epsilon Lyrae). One star split handily, but the other was a little more difficult, requiring one to wait for a moment of good seeing to glimpse the darkness between the stars.

Views of Jupiter were only OK, with moon Io just coming out from behind the King. M81, 82 were studied by the visitors,

who were awed by the fact that they were looking at 11 million year old light. The Dumbbell Nebula (M-27), Andromeda, Trifid Nebula, Lagoon, Eagle, and my personal favorite, the Omega Nebula, were but a few looked at. The Globular cluster M4 in Scorpius were observed, being located first by the guiding light of Joe Hillberg's recently purchased green lazar. Joe's green lazar can literally point out stars and other objects, in effect acting as a beacon to those attempting to find them using a telescope. Eventually, everyone left on a short drive to their homes, that is, except Ron and I. I joined Ron's attempt to view the entire Ring Nebula, using 20x80 binoculars. We felt certain we had succeeded, but only with the use of UHC filters ingeniously mounted on each eyepiece. The Ring was not as concentric as we assumed, nor continuous.

The main event of the evening was, of course, Mars. Bright and getting bigger, it arrived at about 1:15am. It was quite a novelty to see Mars (not the Moon) rising up through the pines in the surrounding mountains. Both Ron and I were able to see some detail on the surface. The polar cap was the most obvious, however, one could also make out elongated bands of darkened areas when seeing was good, while utilizing a yellow filter. Ron's stopped down 22" showed a small patch at the bottom, presumably the South Pole? We were seeing much detail already, but imagine Mars roughly 3 times larger, as it will be in August!

Venus came up prior to dawn and looked to be slightly less than fully illuminated.

Venus wasn't the only thing that came up at dawn. At the summit of what I now call Proboscis Peak, reside swarms of very smart mosquitoes. I'm certain they co-ordinate their attack, so that while you're busy fanning Ms. Kedo away from your ear, dozens of her buddies are busy quietly removing pints of blood from your ankles, elbows and the backs of your knees.

After breaking down camp in record time, Ron and I stopped at a fine local diner for breakfast. We mused, that despite the bugs, all had an outstanding evening.

P.S.- I lied about the Subaru and probably exaggerated a little about the mosquitoes. Hey, this is Nightwatch, not the NY Times!

Bob Akers

JUNE STAR PARTY

The June 28, 2003 star party will be held at Joshua Tree National Park, Cottonwood Springs campground, half way around **loop B**.

Some scenes of the 2003 RTMC

Bob Akers will describe the content of the photos shown here at the General meeting.





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