

OBSERVER

A WALK IN THE ZOO



ELEPHANT TRUNK NEBULA

Alan pulled this image from the beautiful emission nebula IC 1396 in Cepheus. It lies nearly 3,000 light-years away. He used his QSI540wsg CCD camera on a 7-inch Mak-Newtonian.

Image copyright 2010 Alan Erickson with processing help from Warren Keller

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1..... Last quarter moon

8..... New moon

14..... First quarter moon

23..... Full moon

30..... Last quarter moon

SEPTEMBER SKIES by Dennis Cochran

Last year we visited the many gaseous nebulae bubbling out of the teapot of Sagittarius the Archer. This sky-actor of the Greeks is, like many constellations, a fanciful human-animal mixture, a man-horse armed with a bow which he aims at Antares, the heart of the Scorpion. His bow curves up the right side of the lid and body of the teapot, while the tip of the spout is the point of his arrow. In September, '09 we mentioned the features we see in the spiral arm towards the center of the galaxy that spin in the steam rising from the teapot's spout, like the Trifid, Omega and Lagoon nebulae. See that write-up for a tour of those famous M-objects. We'll do the Teapot this time, emphasizing a different set of objects.

In September, the line marking the bottom of the teapot is now slanted from northeast down to the southwest. This tilted line harbors several

globular clusters: M54 at the left end near ζ (zeta) Sag and M70 halfway down towards ε (epsilon) Sag. Sliding beyond M70 we come to the fainter globular, NGC-6652. Upper left from it is M69; below-right of that is the Epsilon star at the lower end of the teapot. While you're down there, if Sagittarius is high enough in the sky for you to see under him, you'll find Corona Australis, the Southern Crown, a curved-line constellation a bit like a cup on its right side. The upper-left part of its curve has "a field of bright and dark nebulae and obscuring dust" (*Peterson's Field Guide*), featuring NGC objects 6726 and 27, 6729 and the faint glob, 6723.

Continued on Page 3

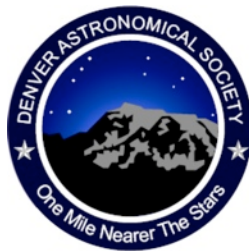
PRESIDENT'S CORNER

From the arbitrary point of January 1 in its slightly elliptical orbit, the Earth has completed about 3/4 of its annual circuit around our star, the Sun, and from our perspective in the northern hemisphere on this tilted planet on September 21st, the Sun moves below the projected plane of Earth's equator. Most of the children of the inhabitants of North America are back in school, harvests of crops are taking place, leaves on deciduous trees are turning all sorts of colors and parents are back at work pulling out the heavier clothes for cooler temps. For those of us who watch the lights in the night sky we get a few weeks of especially clear weather and more stability in weather patterns, as the high thermal heating of summer has dissipated and the exchange of heat and cold between high latitudes and low latitudes is more in balance. i.e. it's "Fall!"

At this time of year DAS members are gearing up for a busy couple of months before winter, and getting out to enjoy the constellations of Fall, as well as still observing the Milky Way summer objects, now in the western sky. We anticipate better and earlier views of the giant planet Jupiter and its ever-changing atmosphere. As our kids get back to school we look forward to sharing our love of astronomy and our telescopes with more students and their teachers. You may have heard our requests for your help by volunteering your time and talents, as Keith Pool is rebuilding our cadre for school and other astronomy outreach

programs. I hope you'll find some time in your busy schedules to share your enthusiasm and not keep all the photons from space for yourself or friends at the DAS Ed Kline Dark Site. To volunteer, contact Keith, or any board member. In the long run, bringing in a new generation (regardless of age) of amateur and professional astronomers is critical to your enjoyment of the night sky in so many ways.

Coming up the weekend of October 16th is our Colorado Astronomy Day, which coincides with National Astronomy Day. We are planning a much bigger weekend-long series of activities in conjunction with the Denver Museum of Nature and Science (DMNS), which will be inaugurating its new IMAX 3D theatre with the Hubble IMAX 3D movie and hosting a teacher conference on NASA's missions to asteroids and comets. We have been asked to support both these significant events with speakers, volunteers and telescopes. Solar viewing from the DMNS patio is easy; finding faint asteroids or comets from heart of Denver will be difficult, but I know we have some talented members that would love this sort of challenge. Stay tuned for more details on Astronomy Day activities as Keith and I request that you join us



PERSEID METEOR SHOWER

Ron spent some time in the dark, wee hours of the morning of the Perseid meteor shower. See his article on page 5 for more information.

Photo copyright Ron Pearson



as a volunteer with a telescope, a talk, to answer questions at our DAS table or at Chamberlin Observatory Open House south lawn.

If you are into telescope building (or if you aren't, you should be), the annual DAS Auction is also coming up. Many of us love building telescopes or their related accessories or just acquiring astronomy related stuff at bargain-basement prices. The auction is

Continued on Page 3

Society Directory

- President:**
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| Keith Pool | Dan Wray |
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- DAS Correspondence:**
 Denver Astronomical Society
 Chamberlin Observatory c/o Ron Pearson
 2930 East Warren Avenue
 Denver, Colorado 80210

The Executive Board conducts the business of the DAS at 7:30 p.m. at Chamberlin Observatory. Please see the Schedule of Events for meeting dates. All members are welcome.

www.denverastro.org

SEPTEMBER SKIES (CONTINUED)

Now, back at the left end of Teapot's bottom, if you search mostly east and a bit south below its handle about two handle-lengths, you'll find the large, loose globular M55, a mere 17,000 light-years away. Then, up to the left of the star λ (lambda) Sag at the top of the lid, we find M22, twice-mentioned here in recent months, with a faint neighbor, NGC-6642 above-right of M22, while another glob, M28 (almost star-like), lies above-right of λ (lambda) Sag.

Bouncing back to the Teapot's bottom, from the right end continue sweeping right, but now level to the horizon, for the large, hazy open star cluster, M7, a binocular object that forms a triangle with γ (gamma) and ϵ (epsilon) Sag, the two stars of the teapot's spout. Globular cluster NGC-6453 is on the right edge of this cluster. To the upper-right of M7 is slightly-smaller M6. These two large star clusters are beautiful objects for smaller scopes. South-southwest of the M7-M6 line are the Cat's Eyes, the two stars that make up the Scorpion's tail, being Lambda and Upsilon of that constellation. Now, if you can see the very bottom of the 'J' shape of the scorpion, where the body of the scorpion first turns left to start the curve of his tail, there is star cluster NGC 6231, which resembles a miniature Pleiades. This entire rich sky region is in a spiral arm about 5,000 light-years nearer to the center of our galaxy than we are.

Closer to home, Jupiter rules the planets, primarily by being up all night, as Saturn disappears sunward from the scene. When will Jupiter's South Equatorial Belt return? There is an entire article about this phenomenon in the Sept. *S&T*, P. 50. Maybe you will see the big comeback as they describe it; maybe it'll be back by the time you look! You may be able to witness the whole unfolding drama just by looking at Jupiter every evening. And while you're there, green Uranus lies just a degree above Jupiter, so you can score two gas giants in one field of view. Blue Neptune is still off the left end of Joker's grin, Capricorn. Don't look for it on the 19th-20th when the full moon will be blasting through that part of the ecliptic. The Jupiter-Uranus pair will be blasted on the 22nd.

Comet Hartley will be cruising east through southern Cassiopeia in late September. It comes around every 6.5 years (P. 52 of *S&T*)

Meetings: Open House, our monthly public star party, occurs at Chamberlin Observatory on Saturday the 18th, when the waxing moon will be far past 1st quarter. The General Meeting is on Friday the 24th at 7:30 P.M. at Olin Hall at DU, and on Friday, Oct. 1, the E-Board will meet at Chamberlin.



BUTTERFLY NEBULA (IC1318)

The bisecting dust lane of this nebula is 20 light years thick and is physically bound to the emission nebula and its parent molecular cloud complex IC 1318 in Cygnus. This image also includes the reflection nebula GN20.25.3 (the small blue smudge in front of the dust lane). Please talk to Darrell for imaging details.

Image copyright 2010 Darrell Dodge

PRESIDENT'S CORNER (CONTINUED FROM PAGE 2)

a great place to unload stuff you aren't using or have outgrown, make a few bucks and save mega bucks for your next project. The auction proceeds go to the Van Nattan-Hansen scholarship fund, which we use to help jump-start the next generation of astronomers and scientists. You can meet some of the "best and brightest" next generation if you join us at the

September General Meeting, where we hope to present significant awards to this year's Van Nattan-Hansen Scholarship winners!

The Earth's cycle of seasons goes on and so must our efforts at sharing our love of the sky, the stars, galaxies, nebulae and all the other 'animals in the "zoo" of the universe.—Ron Pearson.

NEW ASTRONOMER'S DEN

September 17 & 18, 2010 - 7:30 p.m.

Of Flying Horses and Endangered Princesses



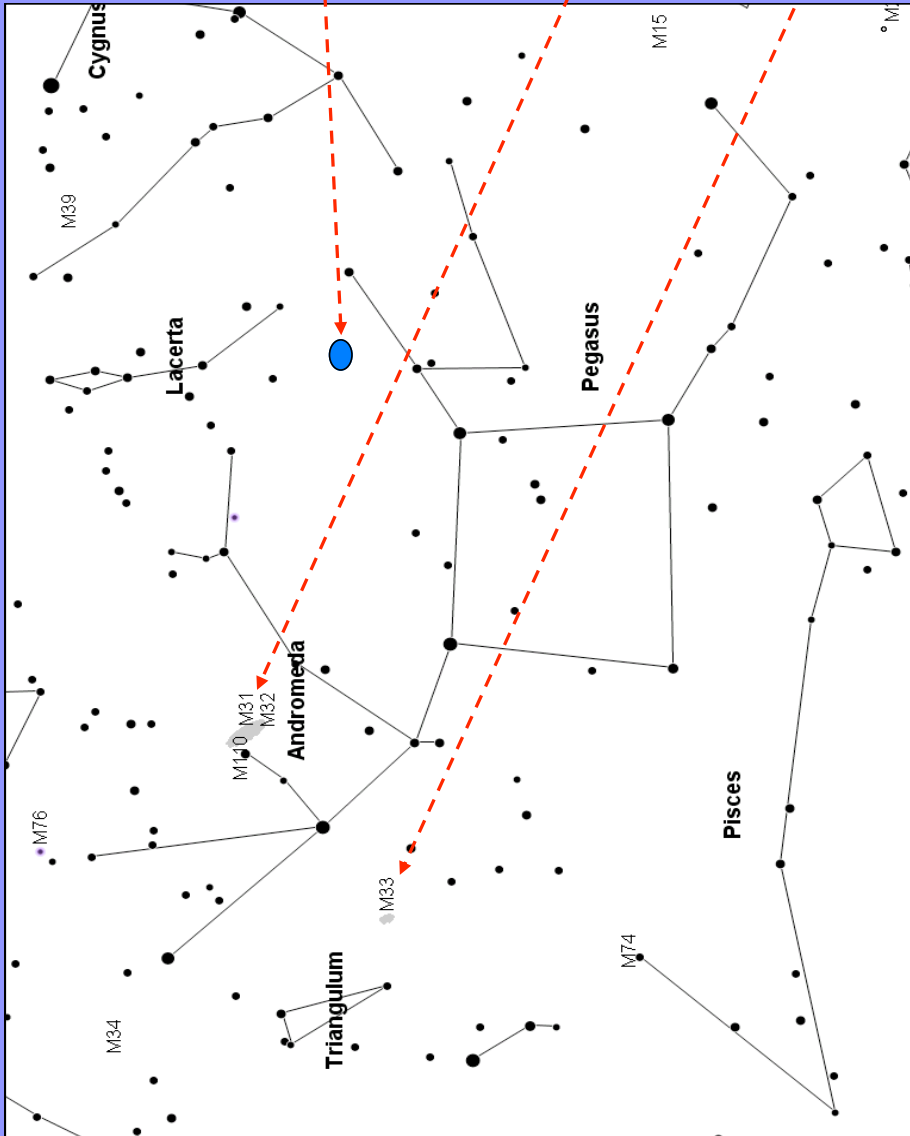
The Grande Dame of the night sky, M31 is a small hazy oval to the naked eye, though this represents only the very nucleus of the system. The galaxy covers an area 4 times the size of the full moon.



The Deer-Lick galaxy cluster (NGC 7331) is a challenge under light-polluted skies, but well-worth the search. A total of 70 galaxies make up this group of spirals and ellipticals.



The Pinwheel Galaxy, M33, is part of the Local Group of galaxies, to which M31 and our own Milky Way belong. Dark skies bring out the subtle starry arms and dust lanes.



Northeast sky — 9 p.m.

Pegasus the Flying Horse and **Andromeda the Princess** herald the arrival of Autumn with an easy-to-recognize star grouping and the northern night sky's brightest galaxy. The square of Pegasus is unmistakable, and the hazy spiral, M31, the Andromeda galaxy, is truly a sight to behold. The tale of Pegasus and Andromeda tells of a hero (Perseus) flying to save the life of his true love (Andromeda) on the winged horse, bearing the serpent-crowned head of Medusa. Sight of the gorgon would turn the viewer to stone; thus did Perseus defeat Neptune's sea monster, the Kraken, before it could devour Andromeda.



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star chart courtesy
TheSky6 astronomy software suite.
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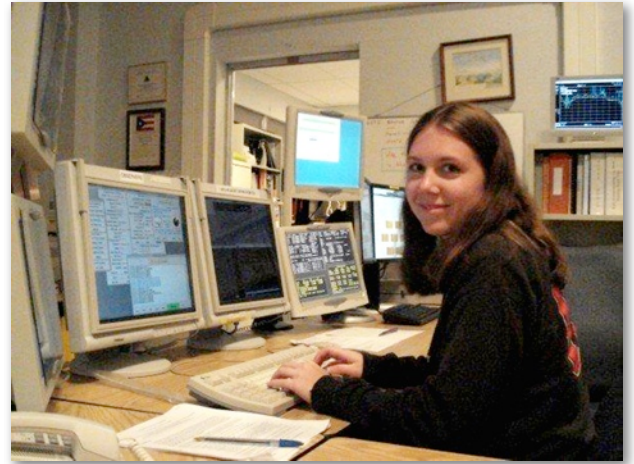
SEPTEMBER SPEAKER IS JAMIE LOMAX

Our September speaker, Ms. Jamie Lomax, is a graduate student at the University of Denver (DU) in the Astronomy and Physics Department. She will tell us of the research she is doing on Beta Lyrae, using spectropolarimetry to study binary stars. Beta Lyrae is now in a complex phase of its evolution due to mass transfer between the two stars of the system. In addition, the system has formed an accretion disc and jets because of this transfer. The star is a well-studied eclipsing binary, but has yet to be resolved or well understood. Since polarized light can reveal important geometrical information, its use provides new information about the system without the need to resolve it. Ms. Lomax is using spectropolarimetry to quantify the shape of the accretion disc and the source of the jets in the Beta Lyrae system. This will help explain the movement of matter

between the two stars and its loss from the system.

Ms. Lomax is originally from a small town in the middle of the Adirondacks in upstate New York. She majored in Physics and Mathematics at St. Lawrence University in Canton, NY, moved to Colorado in 2007, and has been a graduate student at DU since. Besides astronomy, she enjoys skiing and hiking.

All our members, and especially the double star observers, should find her presentation fascinating. Plan to join us on September 24th.



JAMIE LOMAX

Jamie will speak to the September general meeting assembly of the research she is doing on Beta Lyrae, using spectropolarimetry to study binary stars.

Photo courtesy Jamie Lomax

CHASING THE “ARROWS OF PERSEUS”

by Ron Pearson

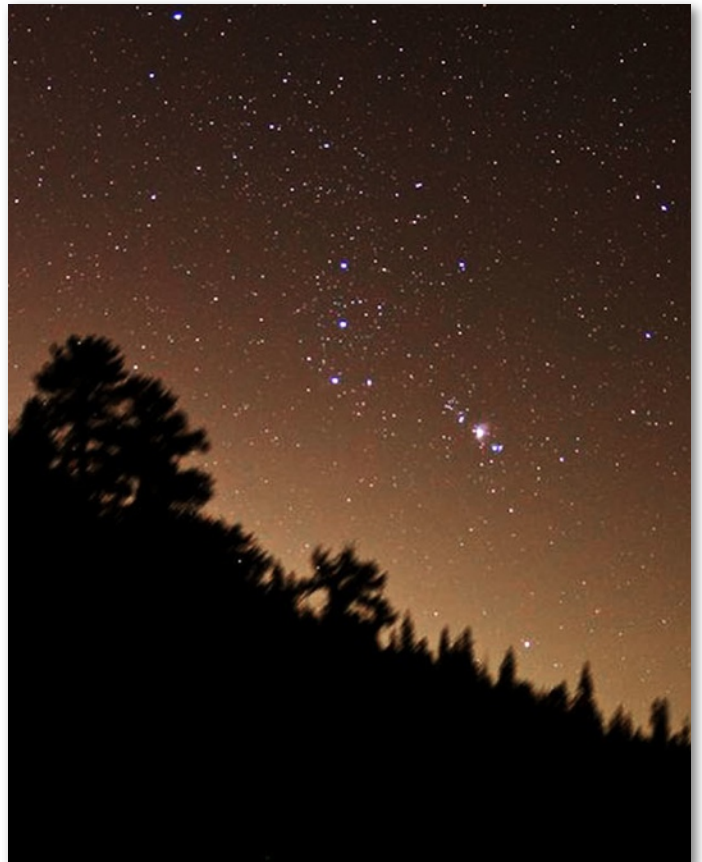
Had a pretty nice “morning” (1-4:30 A.M.) of shooting star fields from Echo Lake—saw quite a few “shooters” but no real fireballs or long lasting trails. I set up the Canon 7D with ball head on my SP mount, tracking but no guiding, and shot mostly two-minute exposures at 1600 ISO and Sigma f/2.8, wide zoom (17mm.) The last shot of Orion is a 62-second exposure, 33mm at f/3.5, shot at 4:30 A.M. when I packed it up (image right). I only managed to capture about 3 shooters—the first image is the best—just north (right) of the North America nebula in Cygnus (See the “President’s Corner” on Page 2). I did no processing on the first image, and made just a couple of adjustments on the other two. The tree was lit up by a passing car (which was more of a problem this year because more people were up watching the shower or just driving up Hwy. 103, I guess.) The lights on the lodge were a pain, but gave me something to focus on.

The weather was good, no wind, and temperatures only got down to about 40 degrees. I was off the road on the west end of the lake on the gravel path. It took me a while to figure out how to use the “Bulb” setting and remote timer settings on the 7D to get f/2.8 and shoot a sequence of long exposures. After realizing it wasn’t going to be a meteor “storm,” I just had fun shooting star fields for the heck of it. A bit of fooling in PhotoShop® will likely get the color balance from light pollution out and increase contrast. The 7D is great for the short exposures but not super H-alpha sensitive, as you can see from the barely-red nebulae in Milky Way.

ORION STARFIELD

Ron imaged the famous hunter while he hunted Perseids.

Photo copyright Ron Pearson



REUNITED IN CALIFORNIA

by Jack Eastman

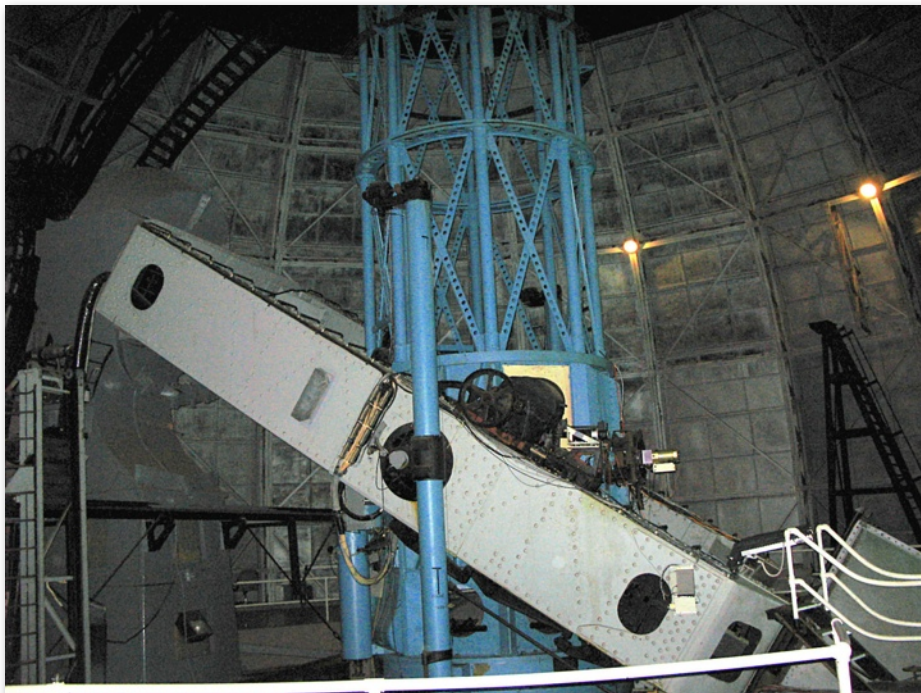
(Because of the length of this article, it will be presented in two parts)

It happened again, a road trip out West to the “Land of Perpetual Smog,” primarily to the 60th anniversary of Mira Costa High School, my alma mater of 53 years ago, in Manhattan Beach, California. Why, you ask, is this of interest to readers of the *Observer*? Probably it isn’t, but it’s what happened after this terrific all-class reunion—an all-day expedition to the historic Mt. Wilson Observatory, followed by an all-day visit to the Griffith Observatory.

Moby, the old van, passed its physical, sort of, and I got packed up and headed out Thursday morning, July 22. The trip was the same old route I’ve described many times before, journeying out to the annual Riverside Telescope Maker’s Conference (RTMC), a reunion of sorts in its own way. This time it was straight through Barstow, CA on I-15, on to Victorville, then down into a layer of seriously dirty-looking air into San Bernardino, then west toward the beach cities. The Los Angeles basin is one giant traffic clot. After 20 miles or so on Highway 210, things plugged up, and for the next 55 miles or so it was creep and stop, creep and stop, creep and stop—top speed on the freeway, maybe 45 m.p.h. in spots, mostly less than 20. At last, I arrived at Hotel Hermosa, got checked in and all, a really nice place with very pleasant folks at the helm.

Marilyn Hancock, one of my classmates from the class of 1957, had e-mailed me about the possibility of a trip up to Mt. Wilson sometime during the big reunion. I e-mailed our old DAS cohort Carla Johns and got everybody more or less connected. Carla was able to get the Monday after the reunion weekend off and agreed to host our bunch at Mt. Wilson. Marilyn offered to pick me up at the hotel, along with a couple of others, Ernie Woods and Judy Cleland. We met up at the historic Bob’s Big Boy hamburger joint in Burbank, had lunch and headed out.

I didn’t recognize much, but we were heading up to Mt. Wilson from Burbank, not the route from Pasadena that I was used to. At times, it seemed like we were lost; we should have at least seen evidence of the Jet Propulsion Laboratory, as the usual route, Highway 2 (Angeles Crest



BEHEMOTH

The 100-inch Hooker telescope at Mt. Wilson.

Photo courtesy of Judy Bergen

Highway) starts out only a mile or two from JPL. We turned down a tiny neighborhood street for several blocks, which turned out to be Big Tujunga Canyon road. The short of it was from here the trip was probably three times as long as Angeles Crest, which was still closed all the way from La Cañada to the turnoff at Mt. Wilson due to heavy damage from the huge fire awhile back. The countryside was truly devastated; it looked like the surface of the moon and reminded me of Mt. St. Helens several years after it blew its top—nothing but bare ground. This was the scene most of the way to the observatory.

At last, we finally arrived at Mt. Wilson. Carla’s plan was, first, an in-depth visit at the 60-inch, then walk around the grounds, and the grand finale, the 100-inch.

We went in the dome, and among other things, Carla and husband, Todd, dragged much food, munchies and all to restock the pantry in the dome. We were able to look over the 60-inch in detail, go into the basement (the Coudé Room, or maybe more properly, the Clock Room) where the

large gears are that move the telescope east and west (Hour Angle). It sure seemed empty from my visits of a half century or so ago. The large weight-driven clock for tracking was gone, as was much of the mechanism for clamping and unclamping the drive gear. The “microscope” for reading the hour circle from the control desk upstairs seemed to be missing, as well. The telescope has been computerized and all the motions, slewing, setting and tracking are now done with just the large worm gear that used to be used only for tracking.

Back upstairs we saw the extra “cages,” upper sections to the telescope tube, Newtonian focus and the Coudé mirror. The Cassegrain focus is the one installed on the telescope, and there is an eyepiece! This scope is not used all that much for research, but rather for public outreach, with viewing sessions for various groups, including the Los Angeles Astronomical Society. Carla moved the scope so we could try to get a view of the mirror. We really didn’t see it, but we did look at the back of the glass through the mirror mount structure—St.

Gobain wine bottle glass, a beautiful emerald green, 60 inches in diameter, 7 inches thick and weighing about 1900 pounds. The telescope tube itself floats on a large drum of mercury to relieve most of the weight on the bearings so it can be moved with a minimum of effort. It was the world's largest active telescope when it saw first light in 1908, and was the first truly research-grade reflector.

After thoroughly going through the 60-inch we hiked down to the “monastery,” the sleeping quarters for the visiting astronomers. This was a first for me; I'd never been past the shop/library/laboratory/pool hall building a bit farther up the road. Carla didn't have the keys to this; pity—it would have been interesting to poke around in there and see if that really nice pool table was still there. I think every major observatory has a first class pool table! Lick and Palomar sure do.

Walking farther down, we stopped at some large concrete piers, one of which had a bronze plaque identifying it as where Michelson set up his equipment to measure the velocity of light between Mt. Wilson and Mt. Baldy in 1926.

On the way to the dome of the 100-inch we stopped at the little “cook shack” at the end of the causeway. Carla explained that this small kitchen was placed out away from the telescopes because Hale, the first Director, was afraid of someone starting a fire in the dome if there were kitchens inside. Finally, it was on to the historic 100-inch Hooker telescope.

We climbed up the three staircases to what is called the “bullring” immediately under this huge 100-ton piece of machinery. Here the mirror end of the telescope looks much like the nose of a large steam locomotive. Through a vent one can look at the actual 13,000-pound piece of glass, emerald green (as the 60-inch's) with numerous bubbles (reminds me of St. Paddy's day—great quantity of green beer.)

The glass had to be cast in three melts, which gave rise to all the bubbles. Ritchey, the optician who was responsible for the grinding and polishing, and Hale, the Director, rejected the first blank; St. Gobain tried again. After more trepidation and deliberation it was finally decided to use the first piece of glass after all. Roughly six tons of French wine bottle glass was ground and polished to a final accuracy of about a millionth of an inch to become the world's largest-ever telescope. Think of all those wine bottles that gave their lives for this instrument! The 100-inch saw first light in 1917, a view of Jupiter that was very disappointing, a really terrible image. Was the telescope a failure? Hale and a couple of

others returned in the wee hours of the morning and tried again. Perfection! It seems the dome had been open all day and the mirror was distorted by the warmth of the day, but after settling most of the night the distortions disappeared.

We then went up on the main floor where the control desk is located. Carla opened the dome and then gave us a ride. One is absolutely convinced that the telescope is turning about a vertical axis—clearly not the case, but the dome rotation is so smooth and quiet that there is no sensation of motion. For proof that this was an illusion, we looked outside and noticed the landscape was also majestically moving by.

Now it was downstairs to another control room and into the Coudé focus station, where we could see the huge slewing and driving gears, the latter being a 1440-tooth worm, 17 feet in diameter. Like the 60-inch, the weight-driven clock drive is disconnected and all the movement of the telescope is operated through the big worm gear by computer. “Danger-Laser” signs are all over the place, part of the laser-induced artificial guide star for their advanced adaptive optics system, which measures the turbulence of the atmosphere and corrects for it, giving a much sharper image than the telescope alone. Like the 60-inch, the 100-inch is supported by mercury floats at both ends of the polar axis, allowing effortless moving of the 100-ton mass. The original driving clock was said to produce about 1/100th horsepower. Down in the bowels of the building we found the parking places for the upper cage sections of the telescope, the Coude' mirror, which sends the light to powerful spectrographs in the basement, the Cassegrain mirror, which is on the telescope, and the empty place for the Newtonian focus, empty because this setup was given to the Smithsonian, no doubt with Edwin Hubble's chair. It was a true piece of history to see the boxes, both here and at the 60-inch with names such as Baade, Zwicky, Humason, and Hubble, the pioneers of discovery that put Mt. Wilson forever on the map.

Alas, all too soon we were heading out. We didn't get over to the solar telescopes; that'll have to wait for another trip. We headed back down to Pasadena and had a wonderful Mexican feast at El Cholo, highly recommended by Carla. Lesson taught—the freeways seem to actually move late at night, and Marilyn dropped me off at Hermosa for a well-earned sleep.

To be continued next month . . .

ABOUT THE DAS

Membership in the Denver Astronomical Society is open to anyone wishing to join. The DAS provides trained volunteers who host educational and public outreach events at the **University of Denver's**

Historic Chamberlin Observatory, which the DAS helped place on the National Register of Historic Places. First light at Chamberlin in 1894 was a public

night of viewing, a tradition the DAS has helped maintain since its founding in 1952.

The DAS is a long-time member in good standing of the **Astronomical League** and the **International Dark Sky Association**. The DAS' mission is to provide its members a forum for increasing and sharing their knowledge of astronomy, to promote astronomical education to the public, and to preserve Historic Chamberlin Observatory and its telescope in cooperation with the University of Denver.

The DAS is 501 (c)(3) tax-exempt corporation and has established three tax-deductible funds: the Van Nattan-Hansen Scholarship Fund, the DAS-General Fund and the Edmund G. Kline Dark Site Fund. To contribute, please see the bottom of the membership form for details (found on the DAS website: thedas.org).

More information about the DAS, its activities and the special tax-deductible funds is available on the DAS website at www.denverastro.org.



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DAS SCHEDULE

SEPTEMBER

- 10-11 EGK Dark Sky weekend
- 17 E-Board meeting at Chamberlin (Begins at 7:30 P.M.)
- 17 and 18 "New Astronomer's Den" on the south lawn at Chamberlin (Begins at 7:30 P.M.)
- 18 Open House at Chamberlin Observatory (Begins at 7:00 P.M.)
- 24 General Meeting at D.U.'s Olin Hall (Begins at 7:30 P.M.)

OCTOBER

- 1 E-Board meeting at Chamberlin (Begins at 7:30 P.M.)
- 2 Chamberlin Public Night Operators Recertification meeting
- 2-10 Okie-Tex Star Party
- 8-10 EGK Dark Sky weekend
- 16 Colorado Astronomy Day (Details forthcoming)
- 23 DAS Auction at Chamberlin (Begins at 11:00 A.M.)

Public nights are held at Chamberlin Observatory every Tuesday and Thursday evenings beginning at the following times:

March 9 - April 14 at 8:00 p.m.

April 15 - September 1 at 8:30 p.m.

September 2 - March 8 at 7:00 p.m.

Costs to non-members are: \$3.00 adults, \$2.00 children.

Please make reservations via our website (www.denverastro.org) or call (303) 871-5172.



The Denver Astronomical Society
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