

OBSERVER

A Bird's-Eye View



HOT HYDROGEN CLOUDS -- A SWAN'S TAIL

Strewn along the the summer Milky Way's disk are a myriad of beautiful nebulae, none more so than the hydrogen-rich North America and Pelican nebulae, NGC 7000 and IC 5067/70, in Cygnus the Swan. Combined, these two HII regions cover an area six times larger than the full moon, yet low surface brightness makes specialty filters a must for visual work. Ionization from each's respective embedded star clusters will change their shapes millions of years from now.

Image copyright 2010 Alan Erickson

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MAY SKIES *by Dennis Cochran*

Plateau Vol. 50 No. 3, published by the Museum of Northern Arizona in Flagstaff in 1978, was about astronomy in Northern Arizona. In their article about Lowell Observatory they had a great photo of the 72-inch Perkins instrument located at the Anderson Mesa site. This scope, owned by Ohio State and Ohio Wesleyan Universities, is an older design similar to the 74-inch scopes built by Grubb-Parsons—including the Australian instrument that perished in the wildfire—with a two-pier, cross-axis mount and an open, straight-trussed tube. The Perkins scope has a shorter focal ratio than the usual *f/5* of these types, more like *f/4*, which gives it more pleasing proportions than the geeky *f/5*s. It has huge setting circles down at the thrust bearing for right ascension and below the large counter-

weight on the dec. axis. This is the type of scope that appears in the Hugo Balin mural at Griffith Planetarium. Funky! The following page has a color photo of the 24-inch Lowell refractor. I'll bring this magazine to the next Show and Tell.

On to the planets. Mars, the Red Planet is only 7 arc-seconds wide these days on the ecliptic, far to the west of brighter Saturn. Saturn is cruising through the western end of Virgo, below the tail-end of Leo and above the 4-sided "sail" pattern of Corvus the Crow. The Ringed Planet is highest in the south about 10 P.M. on May 1, but this high-point occurs earlier as the month moves on. Brighter Venus is that

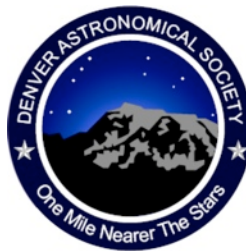
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PRESIDENT'S CORNER

May brings us one of the sweet times of the year for observing. The galaxy clusters in Leo and Virgo are in full bloom high up in the sky after evening dusk, the temps are warming up so we don't have to freeze fingers to telescope tubes or wear tons of winter clothes to stay warm and we don't have to wait until 10 P.M. or so for it to get dark like we do in summer. This year we have several planets to observe, too. Especially unique is Saturn, with its rings turned nearly edge-on to us down here on Earth. This happens only every 14 years or so as Saturn orbits the Sun. If you pull an all-nighter you can begin to catch the summer Milky Way and all it has to offer.

The DAS is not only about individual observing but also about members sharing the sky with others. May is bringing a lot of DAS activities that I hope you all can partake in. **We'll have a day of solar observing at the "Space Day" activities of the Denver Museum of Nature & Science on May**

8th. If you're not already participating with us, come down to DMNS and enjoy Space Day and view the sun anyway. **On May 15th we'll have telescopes up near Pine, CO. at Pine Valley Open Space Park Behr Observatory, sharing the skies with Jeffco Open Space and folks from Pine, Bailey and the foothills area. Volunteers are requested!** I'd like to thank Keith Pool and Aaron Reid for recently stepping up and taking on the external outreach program. Keith will be taking the lead, so if you get requests for or hear of a need for a school starparty or program, please contact Keith or Aaron. Your participation is also needed, as they will coordinate with those that can bring their telescopes to these events. **And of course we have our monthly Open House star party at Chamberlin Observatory on May 22nd;** all of the E-Board want to thank the many of you who participate regularly. You can be a member of DAS and just download information about astronomy and observing all the time. But there is always a need for participation in the DAS organization, too, because having more participate means more people can learn and enjoy the night sky, which means fewer people will just think you're in a weird hobby of guys playing with telescopes or expensive e-toys. Also, our treasurer, Brad Gilman, could use help and assistance in the form of someone to take on some treasurer duties. The responsibilities of treasurer have grown as the DAS has grown and IRS and other non-profit requirements have multiplied beyond what can be expected of one part-time volunteer. The Van Nattan-Hansen Scholarship Committee has an opening for someone interested in promoting the college education of future astronomers and scientists. Something to keep in mind is that professionally related volunteer



**DAS PRESIDENT,
RON PEARSON**

Photo courtesy Jack Eastman

Continued on Page 4

Society Directory

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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

MAY SKIES (CONTINUED FROM PAGE 1)

huge thing hanging in the western sky at sunset. On the 21st, look just south of her to find star cluster M35.

East of Saturn and a bit north of the ecliptic you'll notice Arcturus, the alpha star of Boötes the Herdsman. At magnitude 0.0 it is the third brightest star in the sky. Ken Hewitt-White tells us in May *S&T*, p. 68 that there are galaxies to be had in the big guy's region, specifically southwest of the gamma star, the one on the western side of the wide end of the kite. Particularly notable are the elliptical NGC 5557, and southwest of that, the edge-on spiral NGC 5529.

Back at Saturn, the Virgo Galaxy Cluster is to his northeast. In the cluster there are other M-object galaxies besides the big ellipticals M87, 84 & 86. From the M84/86 pair, drop south down to M49, another elliptical, and continue down 2/3 of the way into the "bowl" of Virgo to find M61, a face-on spiral. Or, from 84/86, go straight up to find M100, the largest spiral in the cluster. Spirals 98 & 99 are down and to the right from 100. But while you're up near the top of the Virgo Cluster, wander north to the big star cluster Melotte III in Coma Berenices, which gives this region its naked-eye fuzziness. Just to its east is the famous edge-on galaxy NGC 4565 and east of that are yet more galaxies, with still more again north of Melotte III. Then go just northwest of III

to find Sue French's favorite (p. 67 of *S&T*), the grouping of four galaxies called Hickson 61.

Remember those things that can happen to you whilst observing out in the hot stinking desert/cold blowing prairie? Here's Number 5, called "More about Cacomistles." Not dangerous to humans, 'cacs' are gregarious. We saw one at the edge of the circle of light from our campfire deep in the Grand Canyon. They also live in the roof of the cookhouse at Phantom Ranch, and one was spotted on a beam of the dining room at the El Tovar Hotel on the South Rim, staring down at the food. So why mention them? A pregnant cacomistle with big soulful eyes could take up residence in your Newtonian tube and you might not have the heart to kick her out. Also called Ringtail Cats, they are in the

raccoon family, rather like small coatimundis. They may not live in Colorado at all, in which case you'd have to go to the Grand Canyon Star Party June 5-12 to see one. Although this star party is centered on the South Rim, there may be some astro-activity on the more beautiful North Rim (www.tucsonastronomy.org), one of the sublime locations on this continent, with a campground, store and lodge. This is a "show-the-public" star party. After observing, leave the scope's tube horizontal and see if a cacomistle turns up inside next morning.

May's meetings: Texas Star Party, the 9th through the 16th, Open House at Chamberlin, Saturday the 22nd, and the General Meeting at Olin Hall, Friday the 28th.



A PROTO-HUMAN MIST

Nestled in the southern part of Auriga the Charioteer lies the huge emission nebula IC 410, dubbed "the Neanderthal Nebula" for its resemblance to a fossilized skull. Part of a very busy region that includes Ms 36, 37, 38 and the Flaming Star nebula, IC 410 glows from the fires of embedded star cluster NGC 1893. Three tadpole-shaped star forming regions snake about at the 5 and 8 o'clock positions, respectively. This 7-hour HaRGB composite image captures the light from 12,000 light years away.

Image copyright 2010 Steve Solon

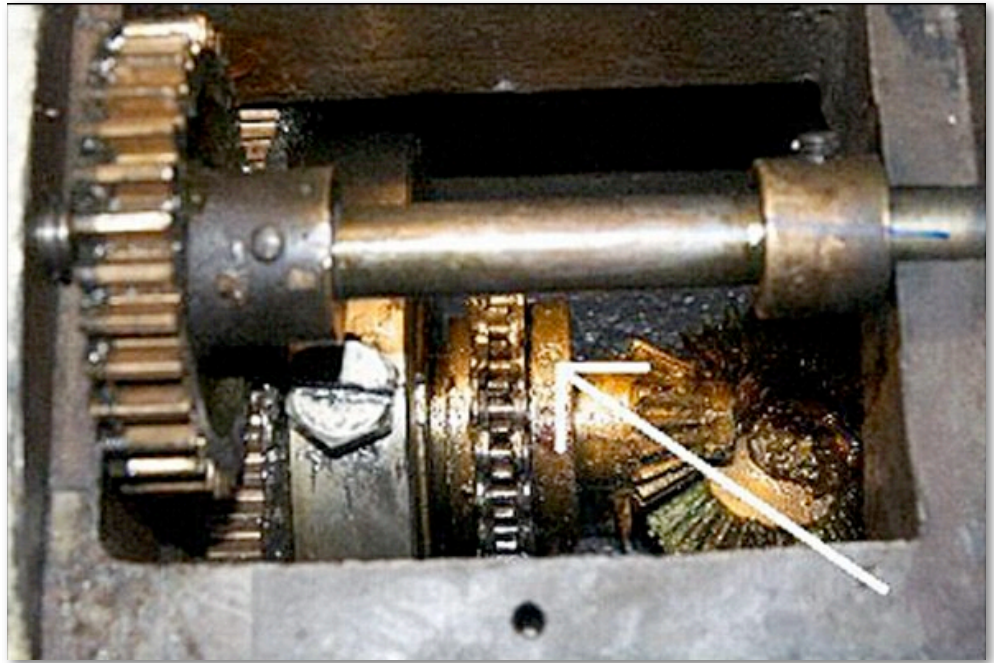
STICKY RA-LOCK MECHANISM REPAIR

by Aaron Reid

On Monday, March 15, 2010, several persons combined their efforts to make repairs on the right ascension lock mechanism of the University of Denver's Historic 20-inch refractor that rests atop the George Saegmuller mount. In attendance at Chamberlin Observatory was Director, Dr. Robert Stencel and Observatory Coordinator, Aaron Reid. From the Denver Astronomical Society (DAS), President Ron Pearson was joined by lens maker/designer Jack Eastman. The fifth person, an antique car restorer, was Charlie Liggett of the Western Colorado Astronomy Club (WCAC). Charlie was called upon due to a very high mechanical intellect; he also possesses an uncanny ability to diagnose sticky mechanisms. In his spare time, he freelances as a repairman of telescopes.

On to the task at hand. Placing our hands on this fine instrument is a feeling to savor. Accessing it safely when it is at the horizontal rest position ~15 feet off the floor is another marvel in and of itself. To reach this height, a couple of sections of scaffolding were procured from WACO rentals. Dr. Bob and I loaded a trailer and tow vehicle, brought the items to the observatory and deployed them. Working height of the top platform with the extension screw-jack legs was about 13'2". With the gantry in juxtaposition for easy access to the scaffolding, the west end of the telescope's workings would be more easily attainable.

The "bicycle chain" (the one that adjusts the slow-motion when the scope is 'locked' in tracking mode) was greased exorbitantly, causing a delay in the removing of the chain and its gear (notice it to the left of the snapped off bolt.) Charlie moved the tensioner to give us more working room and was able to wriggle it off the sprocket. It turned out that after cleaning the short loop of chain there was no master link to be found. It was unionized by press fit. The gears were not coming off easily, either. It appeared that the loosening of a setscrew on the gear's keyway was at hand.



FIXING THE PROBLEM

This image of the interior of the declination shaft shows the site (white arrow) of the broken bolt head of the axis' locking mechanism. Note the accumulated old grease on the gear assembly to the right of the arrow. This was thoroughly cleaned and re-greased to permit smoother operation.

Image courtesy 2010 Ron Pearson

Meanwhile, with me reaching into the telescope tube to apply pulling pressure on the slow motion shaft and Charlie using a special pry bar for added torque, we finally coaxed the gear out. The preload on the mechanism wasn't great in so far as an actual jam. The torque pressure was actually caused by the mechanism's place of rest on carbonized (very old) grease. The two nested shafts had never been seen by any of the persons in the room; it was the "first-light" for them in years, as previous non-descriptive reports suggested, since at least 1982, perhaps even 1918, the year of the first major repair.

The question was raised as to why the shafts had to come out of the telescope tube. The answer was simple: counterweights. The R.A. counterweight stanchion isn't bored out; if it had been, it would require a 3-point disassembly of the R.A. counterweight assembly. Following that course of action, one might wonder why the shafts don't fall out of the scope from the access portal.

PRESIDENT'S CORNER (CONTINUED FROM PAGE 2)

activities look good and count on your resume, too. If you feel you can help out in either of these roles, please let me know.

The future of the DAS Edmund G. Kline Dark Site is currently a question that the E-Board is turning its attention to. We have a bit less than eight years left on the lease, so

questions about what we do are both on the horizon and immediate. The warming hut has suffered significant weather damage recently. We have closed it for now and the possible opportunity to build an observatory plays into question of the future of our Dark Sky Site. Your input and patience in this period are

both needed, and thank you to those that have already offered to help repair the warming hut; we'll be in touch. In the meantime, continue to enjoy the dark sky with thousands of stars and galaxies up there.—Ron Pearson.

We had the scope at horizontal rest in both axes the entire time. The bigger 90° gear is bolted to the flat plate of the inside stanchion of the tube where the tube-assembly runs tangent to the R.A. mounting flange. With those gears removed as a unit we were able to gain access to the shafts, thus bringing them out of the R.A. shaft cavity.

I was careful not to yank or otherwise bully the parts out. Charlie had to catch the washer and bolt off the gear on the other end. The room he had to work with was quite limited (as seen in the photograph.) Had I lost my patience and bullied the mechanism anyway, parts (not to mention fingers) would have been damaged or lost!

The reassembly was in reverse order, of course, after a thorough cleaning—smooth as a figure skater across the ice, the device turned; better than I could ever remember. Speaking of chilly air, the temps during the repair were actually above 50°F in the dome - not too bad either of the two days. Getting the gears to line up was a bit challenging, but none-the-less successful. The day was coming to a close, despite the extra hour of daylight. We put some of the covers

back in place. The first day of this five-day sequence and we were 90% finished with the diagnosed problem.

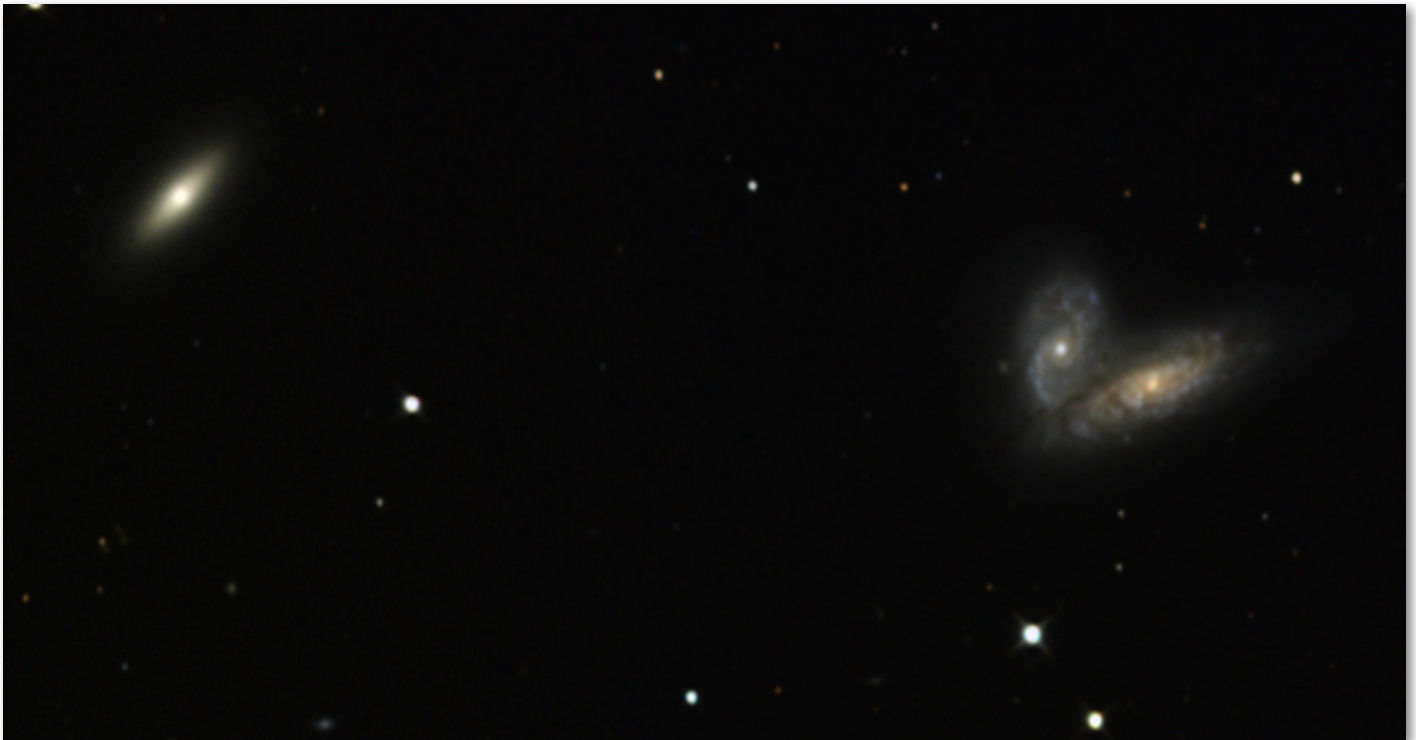
Making sure the R.A. clamp (working so well now) was not locked, we proceeded to work on finding the little rattling u-joint bolt we've all been hearing for years when the scope is tilted. With Jack at the controls and my one hand in the actual telescope tube, we managed to get the screw to roll down and stop short of the baffle. I caught it prior to it nearing the baffle, which at 3" high wouldn't have allowed the bolt to drop on the lens. The scope was never pitched vertically—15° at most. Jack backed off as the bolt started to finally break free and roll; again another great exercise in teamwork.

Now for the final issue—but the day was darkening now for sure. We put tools away somewhat, the lens cover back on and locked up the place. There had to be a way to access the u-joint on the inside of the tube. Brainstorming by everyone was in order. But as we all saw and attempted to photograph, the u-joint with 3 of the 4 screws holding it wasn't going to perform well, even though it was a lot easier to turn.

It would not be much longer before one of the other bolts fell loose. The next day we convened to work on the u-joint.

For a few minutes, the fight to get even four to line up (on the J-joint support plate) enough sure made it tough. I held the things in just the right place. Charlie finessed the final bolt into alignment—another teamwork event. The people that put this piece of equipment together to begin with surely had a precise plan. The bolts holding the u-joint support plate were original, near as we could tell. Accessing this particular interior u-joint wasn't as simple as pulling off the tailstock. Even a small guy such as me couldn't fit in there (the tube assembly)—and no one has 4½-foot arms. And yes we checked the other internal U-joints. Visually they were "tight."

The performance is now flawless, effortless and the rattling bolt is no more. Many thanks to the members of the DAS, Charlie of the WCAC and the Director Robert Stencil for the patience and documentation over the two days it took to get this elaborate piece of machinery back in working order.



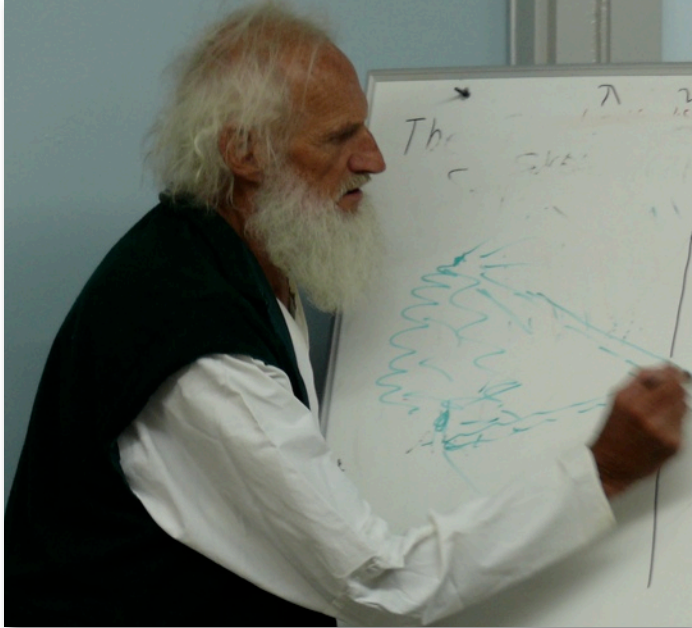
TWINS!

Above are the "Siamese twins" galaxies in Virgo, NGC 4567 and NGC 4564. The galaxy on the far left is NGC 4564. At the dark sky site on February 17, 2010, Joe used an ST-2000XM CCD camera on his 18-inch f/4.5 Newtonian, shooting 20/10/10/10 minute LRGB exposures.

Image copyright 2010 Joe Gafford

OBSERVING ANECDOTES: COMET EASTMAN-EDWARDS-GARDNER

by Jack Eastman



CHIEF OBSERVER, JACK EASTMAN

At a recent Colorado Astronomy Day, Jack portrayed Galileo during a presentation.

In a distant land, long, long ago (California, 1956/7/8 or so) three terminally smitten amateur astronomers set out on an odyssey which promised unparalleled views of the starry heavens from a prime observing location, the home of, what was then, the world's largest telescope. We were still in high school, and only recently had gotten driver's licenses. It was Ed who cajoled his folks out of the car for a weekend. I think it was right after the end of school that the three of us, Ed Edwards, Mike Gardner and yours truly, loaded camping gear, telescopes, camera stuff, some food and water, and set off for Palomar Mountain.

There was an ideal site at the top of S. Grade road* where it turned into E. Grade road. Canfield Road headed north to the observatory and another branch headed west to Palomar State Park. About 20 feet above the highway was a flattened area, used by the highway folks to store equipment, gravel and such, about an acre and a half in size; few trees, a couple to the west, otherwise a perfect horizon. Right across the road to the park was a gas station and small restaurant where we could get supplies and food when and if we got sick of our culinary abilities.

The fateful day came and we set off. This was one of our very first solo voyages far (by our standards of the time) from home, and being away for several nights. We left Manhattan Beach and headed east on Artesia Blvd., out into the country. We passed through Dairy Valley, then onto what is now I-5, through seemingly interminable orange groves and vineyards, to Oceanside, Escon-

dido, then up the steep and windy S6 (S. Grade Road) to 76, and to the site.

Once there, we asked the folks at the gas station if it was OK to set up; the answer was "yes." The folks that ran the place were very helpful—said they'd keep an eye on things should we decide to go up to the observatory or whatever. We set up everything, the scopes, binoculars and all. I had my 6-inch f/8 Newtonian, and I think there was a 60mm refractor and a couple pairs of binoculars, some star charts, and provisions to stave off starvation.

The first night was beautiful, clear, with relatively good seeing. We looked at all sorts of stuff, many M-objects and all, the usual things one would expect under the circumstances.

How 'bout M4? It looked high enough now, and so it was. The usual drill—set up on Antares, shove the scope west, and there it was. I expected more—actually it didn't look that much better than down in "Sludge Gulch" in Manhattan Beach. One of the other guys, stumbling around in the dark, bumped into my 'scope, and WOW! Whazzat?? A blaze of stars nearly filling the eyepiece! M4. Now, that's more like it! But wait a minute—this is M4? What was that other thing? Webb's *Atlas of the Stars*—nothing; Norton's *Atlas*—nothing. You don't suppose . . . ? We relocated the thing, about halfway between Antares and M4—faint, roundish, maybe a little grainy looking.

At this point, one must realize that here were three kids, pumped up with excitement and enthusiasm, first "real" camping trip, far away from home and at least 24 hours with no sleep.

Mike, I think this thing has moved a tad to the north. I think it was right between those two little stars a while ago! Mike looks; he thinks it's moved, too, but looks west to him. I think Ed agreed it had moved, only southeast. We piled in the car and zipped off the 5 miles to Palomar; see if we can find somebody around here to report our discovery to. No one. Not too much of a surprise, after all, these guys are busy, and probably don't hear us pounding on the door anyway. So, back to the site. Find our object. Yes, it's moved, but again, we couldn't agree on which way or how much.

By now we're freezing our toenails off. California's high mountains are that way. They can be hot as blazes during the day and go well below freezing at night. The little place across the road was not an all-nighter; they gave up about 8:00 P.M. or so. The good news was that we had a thermos of hot water and a bunch of tea bags. Ed had a patriotic set of plastic cups, red, white and blue. We huddled in the car and made tea.

"I've been cheated! My teabag's a dud!" I cried. Sure enough, my tea didn't go. The others donated their bags, and I stirred and squeezed the darn things. Still nothing. I got a fresh bag and added that. Finally—tea! I took a swig, "Acckgh" Gads! This stuff will strip paint and grow hair on a bowling ball! I could have dumped it out of the cup, sliced it and used the slices for hockey pucks. It turns out I got the red cup. *Red liquid in a red cup under faint light looks clear; an early lesson on the use of color filters and their effects.*

"What's that light over there,?" pointing at the far ridge to the east. "Looks weird. A car? I'm not sure if there's even a road over

**SENIOR PIC**

Jack, you shouldn't have given up finding the photos you might have wanted your editor to use. Handsome Jack!! But, where's all the hair?

there. Look, there're two of 'em. The one on the right is getting bigger, and looks like it's splitting." And so three very tired, cold kids watch what appears as a very bizarre light show on the far ridge. Too weird to describe, very suggestive of something not of this Earth! The show goes on for about a half hour, the light splitting, reforming, changing shape, then all of a sudden—Damn! I know what that is! We jump from the car, aim the telescope at it—the moon! Yes, the moon rising behind a ridge of trees. That half hour was probably more like two or three minutes.

Suddenly it hit us. The moon! The moon is coming up! With the sky brightening, the folks up at Palomar will be giving up. Zoom! Off to the observatory again, but the results were the same—no signs of life. I guess if you finally get your night on the world's biggest telescope, you're not gonna let a little thing like the moon slow you down. Either that, or they already gave up and are off sleeping somewhere. At least the drive up there warmed us up. We went back to the site and hit the sack. Our discovery had set, the moon was up and we were unbelievably tired. The sky seemed to move in bizarre ways, with spurts and stops as we staggered around trying to get our camp in order. I think our eyeballs were going on strike if we didn't give up and get some sleep!

Next morning, we ate a hurried breakfast at the little eatery across the road. We asked if we could call up to the observatory, and the fellow said it'd be an expensive (to us kids) long distance call, as it would be routed through Escondido or worse No direct line the five or so miles up the hill. So up we drove to the observatory yet again. We encountered an older gentleman, thick accent, just coming out of the back door of the 200-inch dome. We described our "find" and got much encouragement. "Go down that road, second house. That's Charlie Kerns' place, night assistant on the 48-inch Schmidt camera. Maybe he can

help." Looking back, I think the person we talked to was Rudolph Minkowski, famous world-class astronomer.

We find Charlie and he, too, is encouraging. "Come back tonight and we'll take a shot with the Big Schmidt' and get your object, if we can. Would you fellows like to see the 48?" Would we?! You bet! Charlie took us up to the dome, well beyond the "off limits" signs on the observatory grounds, and gave us the "cook's tour" of the 48-inch Schmidt, the darkrooms and all. As we were leaving, Charlie said, "Let's look in here." There was the big deluxe edition of Becvar's *Skalnate Pleso* star atlas. "You say near Antares? Between it and M4? Be darned, there's a little yellow circle with a cross in it. NGC 6144, a globular cluster, between Antares and a much bigger yellow circle with a cross in it—M4. Poof! went Comet Eastman-Edwards-Gardner. Poof! went a whole night's observing keeping track of this little booger. But it was an experience and a half—the adrenalin of discovery, and getting the hell scared out of us by a moonrise. Add to that, freezing our tusches off (and for me, tasting what had to be the world's worst tea, of my own making, to boot—I still blame that on Ed and his red teacup!) But the best big finale? We got to see the 48-inch Schmidt camera and talk to a couple of *real* astronomers!

COMET DISCOVERERS—ALMOST

Mike Gardner, Ed Edwards and Jack Eastman in 2007.

Photo courtesy Mike Gardner



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 Public Outreach 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.

S&S OPTIKA HAS MOVED TO:

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Broadway)

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DAS SCHEDULE

MAY

- 7 E-Board meeting at Chamberlin Observatory (Begins at 7:30 P.M.)
- 8 Solar Observing at DMNS "Space Day"
- 14-16 EGK Dark Sky weekend
- 15 Pine Valley Open Space Park, Behr Observatory, volunteers requested.
- 17-22 Texas Star Party
- 22 Open House at Chamberlin Observatory (Begins at 7:00 P.M.)
- 28 General Meeting at D.U.'s Olin Hall (Begins at 7:30 P.M.)

JUNE

- 4 E-Board meeting at Chamberlin Observatory (Begins at 7:30 P.M.)
- 10-12 Rocky Mountain Star Star (RMSS)
- 11-13 EGK Dark Sky weekend
- 19 Open House at Chamberlin Observatory (Begins at 7:00 P.M.)
- 25 General Meeting at D.U.'s Olin Hall (Begins at 7:30 P.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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