The Denver
OBSERVER
SEPTEMBER 2002
Newsletter of the Denver Astronomical Society
One Mile Nearer the Stars

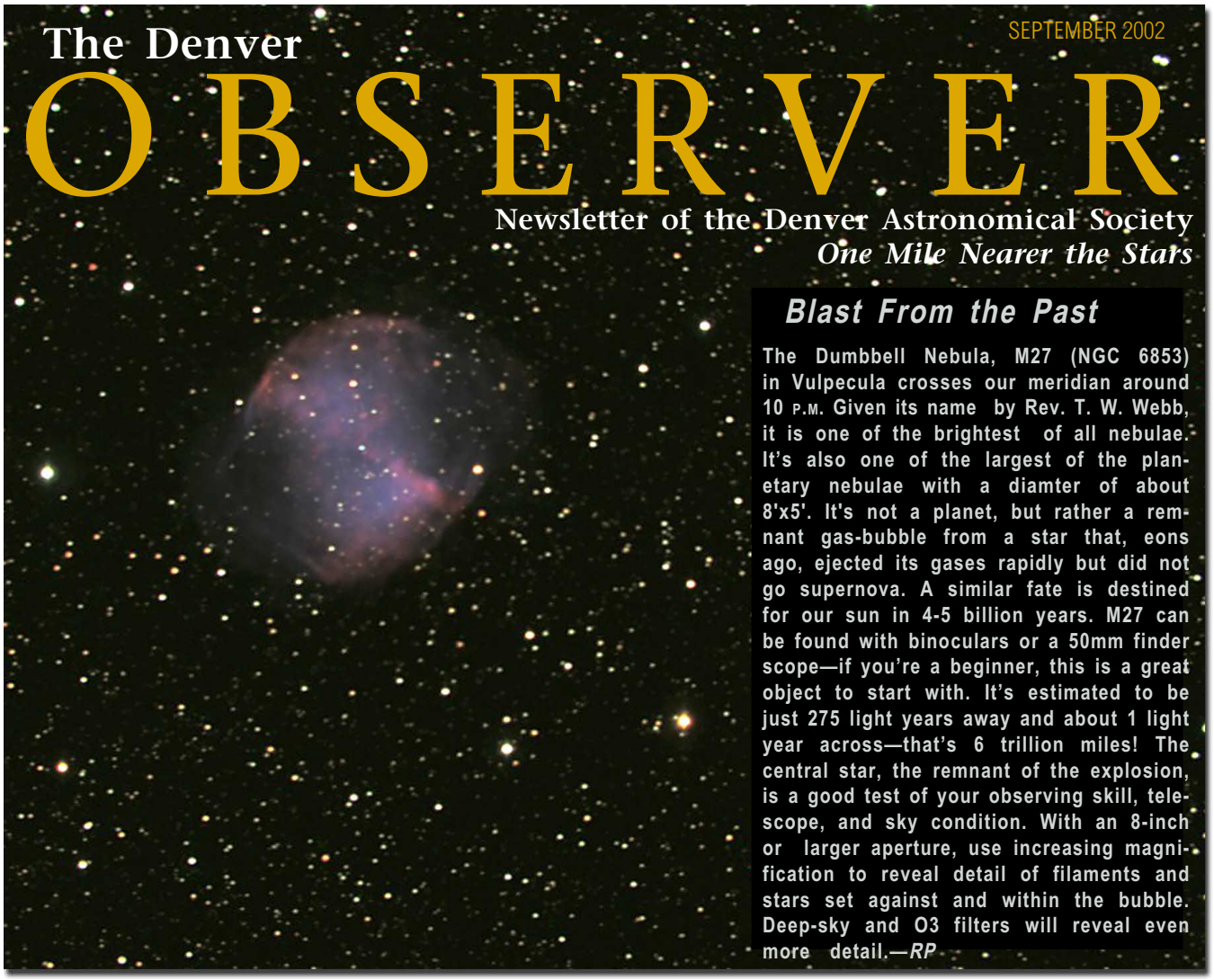

Image: © Chris Tarr, 2002

Blast From the Past

The Dumbbell Nebula, M27 (NGC 6853) in Vulpecula crosses our meridian around 10 P.M. Given its name by Rev. T. W. Webb, it is one of the brightest of all nebulae. It's also one of the largest of the planetary nebulae with a diamter of about 8'x5'. It's not a planet, but rather a remnant gas-bubble from a star that, eons ago, ejected its gases rapidly but did not go supernova. A similar fate is destined for our sun in 4-5 billion years. M27 can be found with binoculars or a 50mm finder scope—if you're a beginner, this is a great object to start with. It's estimated to be just 275 light years away and about 1 light year across—that's 6 trillion miles! The central star, the remnant of the explosion, is a good test of your observing skill, telescope, and sky condition. With an 8-inch or larger aperture, use increasing magnification to reveal detail of filaments and stars set against and within the bubble. Deep-sky and O3 filters will reveal even more detail.—*RP*

Welcome the Longer Nights

Inside The Observer

SEPTEMBER SKIES 2002

September skies bring us to a crossroads both on Earth and in the sky above. Our seasons start to change from summer to fall, our Colorado monsoon retreats back to Mexico leaving clear, cool skies. The days become shorter; best of all the nights for observing get longer. The sun reaches its second equinox and we have the best observing opportunities of summer and fall constellations. The Milky Way with Cygnus, through Sagittarius are on the meridian by dark, and later in the evening, Pegasus, Cassiopeia, and the Great Andromeda Galaxy M31 are all rising in the east. If you stay up later, the winter constellations begin appearing one by one with even more spectacular deep-sky observing available. Early in the morning sky the gas giants, Jupiter and Saturn are reappearing giving us our first looks at them since late last winter. It's back to school, back to work, and back to the telescope or binoculars! Carpe Noctum.—*Ron Pearson*

6 ..... New moon
13 ..... First quarter moon
21 ..... Full moon
22 ..... Equinox (10:56 p.m.)
26 ..... Venus at greatest brilliancy
27 ..... Daylight Savings Time Ends
29 ..... Last quarter moon

Saturn reappears in the morning sky as autumn settles in. We can look forward to cooler temperatures and longer nights.
Image: © David Shouldice, 2002

Image: © John Polhamus, 2002

In spite of smoke-hazed skies for a significant part of the season, John Polhamus managed to get this great summer shot of M20 (The Trifid Nebula).

PRESIDENT'S CORNER

Hello all you scopeless observers. We would just like to remind you that the DAS has an eight-inch "Dob" equipped with a Telrad and two eyepieces that can be checked out by members on a monthly basis. It requires a $200.00 cash refundable deposit.

We are looking for some volunteers to work with public night crews. We need presenters and/or scope operators. If you want to learn to be a scope operator, you must volunteer to work public nights on Tuesday or Thursday nights twice a month. We also need operators to work at the Saturday Open Houses. If you are interested, please contact me by e-mail or telephone.

Congratulations to Patti Kurtz on receiving a Golden Web Award from the International Association of Webmasters and Designers. I know I speak for the entire club when I say that we always knew our web page was outstanding. It is nice to know that Patti is also being recognized. We appreciate the hard work and talent that you have put into the web page.—Larry Brooks, *Email: LBrooks100@aol.com.*

DAS Schedule

SEPTEMBER

6-8 ***DAS Star Party at North Sterling Reservoir,*** *and Dark Sky Site Weekend*

13 *E-Board meeting, 8 P.M.*

14 ***Clean-up Day*** *(4:00 P.M.)* and ***Open House*** *(the Open House begins at dusk.)*

20 *General Meeting at Olin Hall, DU, 7:30 P.M.*—Dr. David Nesvorny (SWRI), *"Asteroid Breakup Event in the Main Asteroid Belt."*

OCTOBER

4-6 *Dark Sky Site Weekend*

11 *E-Board meeting, 8 P.M.*

12 ***Colorado Astronomy Day—Takes Place of the General Meeting*** *(See Page 3)*

19 *DAS Auction (setup at 11A.M., auction begins at 1P.M.)*

Public Nights are held every Tuesday and Thursday from 8:30 P.M. at Chamberlin Observatory
Costs to non-members are: $3.00 adults, $2.00 children.
Please call (303) 281-9052 (new phone number) for reservations.

DAS Officers

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Joe Gafford — Steve Solon
Patti Kurtz — Dan Wray
George Jones, Past President

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StarFire Creations Unlimited
(303) 948-5825

The Observer *is available in color PDF format from the DAS website.*

The Executive Board conducts the business of the DAS at 8 P.M. at Chamberlin Observatory. Please see the Schedule of Events for meeting dates. All members are welcome.

www.denverastrosociety.org

Colorado Astronomy Day Sets its Sights on New Horizons October 12, 2002

It's almost here — that star-studded celestial extravaganza that is sponsored each year by the DAS — Colorado Astronomy Day. This year, we're honored to have the **Denver Museum of Nature & Science (DMNS)** cosponsor the event, as well as the **University of Denver's Historic Chamberlin Observatory (UDHCO)**. *All daytime activities will be held at the museum* from 9 A.M. to 5 P.M., with the usual evening telescope raffle and star party at Chamberlin. Cost for the daytime festivities is admission to the museum.

Colorado Astronomy Day will replace the DAS General Membership meeting for October.

The October issue of *The Denver Observer* will be completely dedicated to Colorado Astronomy Day, with complete listings of speakers, times, and activities.

This promises to be a wonderful day for Colorado astronomy and we hope you plan to join us for all the festivities. If you'd like to volunteer, please contact Larry Brooks.

Following is the line up of speakers and events. Talks will be held at DMNS's Ricketson Auditorium, and door prizes will be given out between speakers:

• Opening ceremonies with speakers **Dr. Laura Danly** (DMNS Curator, Space Odyssey Exhibit) and **Dr. Robert Stencel** (Director of UDHCO). 12:00 noon

• **Dr. Alan Stern** (Southwest Research Institute, Principal Investigator of the New Horizons Pluto Mission, coauthor of *Pluto and Charon: Ice Worlds on the Ragged Edge of the Solar System*)
Title: "Pluto-Charon and the Kuiper Belt: New Horizons for NASA Exploration." 1:00 P.M.

• **Vic and Jennifer Winter** of Kansas City, MO, (Astronomical League *Reflector* editors, and authors of *Our Spacious Skies: Stars, Sun and Storms — A journey through day and night in the heartland*)
Title: "Eclipse Chasing: Seeing the World on a deadline." 2:00 P.M.

• **Dr. John Spencer** (Lowell Observatory, part of the Galileo science team, the Cassini Mission to Saturn, and the New Horizons Pluto Mission. He coedited the book *The Great Comet Crash* about the Shoemaker/Levy impacts)
Title: "Io and Europa: Fire and Ice on the Moons of Jupiter." 3:00 P.M.

The authors' books will be on sale in front of Ricketson Auditorium during the day, and book signings will take place there as well. There will be limited supplies of the books available — if you want to be assured of getting a copy, please visit the DAS online bookstore at: *http://www.denverastro society.org.*

Additionally, public spaces in the Museum will be filled with related crafts, demonstrations, the new temporary exhibit "Liberty Bell 7," and the new IMAX movie "Space Station." Drop by and explore these wonderful space activities:

• Enter the "Star Lab" and discover the beauties of the Colorado night sky.

• Learn more about South American sky stories and lore.

• Catch a glimpse of upcoming activities for "Space Odyssey."

• Activity tables will be available to provide fun and learning for visitors of all ages including the popular "cryogenic" and "comet-making" carts.

• Explore the Sun with specially filtered telescopes on the new Sky Terrace in the West Atrium.

• Build your own rocket and participate in many exciting activities associated with the new temporary exhibit "The Lost Spacecraft Recovered: Liberty Bell 7."

Stay posted for updates on the DAS website. See you there! — *PK*

Artwork: © 2002, Dan Durda

New Horizons
This painting was commissioned from Dan Durda (Southwest Research Institute) in August 2001, for the New Horizons Mission to Pluto. The Pluto horizon spans the foreground, looking past its moon, Charon, toward our distant, star-like Sun. You can see more of Dan's beautiful artwork at *http://www.boulder.swri.edu/~durda/paintings.html.*

AstroTrivia

(Look for the answer in this issue.)

Q. Who were the Celestial Police?

AstroTrivia is contributed by Sandy Shaw.

Note from the editor:

Many thanks this month to **Ron Pearson,** DAS Secretary, who wrote the text for the front page of this issue.

Thanks also go to **Sandy Shaw** for sharing her observing experience of the Adorea occultation on Page 4.

Newsletter contributions (ccd and film astrophotos, members with telescopes, star party candids, short observing anecdotes, observing and imaging tips, etc.) are welcome and encouraged. This is your chance to strut your stuff! **Please call me for submission instructions.**

***Patti Kurtz*
(303) 948-5825

Sky & Telescope ***sends only one notice before subscriptions end. The DAS sends only one issue of*** **The Denver Observer** ***after dues expire. The cost of magazines*** **(Astronomy** ***and*** **Sky & Telescope)** ***is in addition to the annual dues. For questions concerning memberships, please contact DAS Treasurer, Chuck Carlson (chcarlso@du.edu). See the back page of this newsletter for more information.***

u p d a t e s

Adventures in Occultation

by Sandy Shaw

Shivering in strong gusts of chilly wind late on the night of July 12th, I set up my 8-inch reflector while my companions star-hopped to the target field with a 12-inch LX 200. Paul Maley, Vice President of the International Occultation Timing Association (IOTA), and DAS member LeRoy Guatney were only a few yards away in the darkness, busily working with LeRoy's LX 200 amid the flash of red lights. The three of us were hoping to witness the occultation of a star in the constellation Capricornus by the magnitude 12.6 asteroid (268) Adorea. At about 12:58 A.M. MDT (July 13th 06:58 UT), the asteroid's orbit would carry it past TYC 6336-01340, a magnitude 11.4 star conveniently located near Sigma Capricorni. A successful observation would see the star dramatically dim by 11/2 magnitudes briefly as the much fainter asteroid crossed in front of it and then rebrighten as the asteroid glided past.

Astronomers seek to learn more about our minor planets by observing occultations. By using teams of observers spread out in both directions from the predicted centerline including past the area of the occultation path, the various observations can be combined to gather information. The combined reports can measure the size and shape of the asteroid, detect natural satellites of the asteroid, and perhaps find hidden companions to the star being occulted. Even negative observations, when no occultation is seen, are valuable. This particular occultation was ranked 94%, which estimated the probability of at least one successful observation if two people were positioned opposite each other across the centerline with each one 3/8 path width from the centerline.

Occultations can be observed in two ways: visually and by recording on film or CCD. With either method, first you get the right star in your eyepiece field and use an accurate time signal to determine when the occultation begins and ends. When observing visually, you watch the star beginning a bit before the predicted time and use an audio tape recorder to record WWV time signals and your voice to mark the dimming and brightening. Or you can use a stopwatch to time the event's duration. When recording you can do it a couple of ways. One is to center the star, track it, start recording a few minutes before the predicted time, add the time signal to your tape via radio, and continue taping until a few minutes past. A second recording method is similar, except that you stop tracking just before the predicted time and let the stars trail — if successful, the resulting image will show a gap in the trail of the occulted star. Tapes can afterwards be examined frame by frame to determine the event's duration much more precisely than can be done by using a visual method.

Our site was east of Denver near Watkins, Colorado, eleven miles east of Gun Club Road on Quincy. Known as the missile site, it is 39° 38.22′ North and 104° 29.952′ West. Paul and LeRoy chose the site because it was near the predicted centerline for the occultation. The missile site consists of a short strip of an old blacktop road that deadends at a gate close to the main road, Quincy. Distant lights around the perimeter of the site and car headlights rushing by on Quincy made the place a bit lighter than the Edmund G. Kline (EGK) dark site near Deer Trail, Colorado.

Observing on the previous night at the EGK dark sky site, I had located the target star field. It was an easy hop from Sigma Capricorni, which was a naked eye star. A 12mm eyepiece on my 8-inch f/6 telescope gave me 100 power, allowing me to see the faint target star clearly. Although my Dobsonian scope doesn't track, a wind-free, dark night might enable me to see the occultation if I nudged the tube a time or two just before the predicted time of the event. However, at the missile site I encountered two problems. The first was that the brighter site meant that Sigma Capricorni was no longer a naked eye star, so finding the target would take longer because I would have to begin star-hopping from a brighter star that was farther away from the field. But the final blow (!) was the relentless wind howling from the south, the direction where my "dob" was pointed. The wind was not only strong enough to shake the scope but also to repeatedly shove the tube away from its target. On to Plan B - I decided to watch the occultation on Paul's camcorder screen instead.

While I battled the wind, I could hear Paul's and LeRoy's efforts to find the right field as the gusts buffeted them. Their star chart was mirror-reversed from the scope and flapping in the wind. The eyepiece in use had a fairly short focal length, so the field of view was limited. They borrowed my 25mm eyepiece and zeroed in on the target star. After star-hopping to the field from different angles and memorizing a nearby asterism, they were sat-

isfied that they were in the right place and hooked up recording equipment to the scope. To LeRoy's Meade 12-inch LX200, they connected a Celestron f/6.3 focal reducer, a 1.25-inch SCT visual back, a Collins I3 image intensifier, a Watec videocam, and a Hi8 camcorder. Paul also used a radio to bring in WWV time signals and a microphone to enter the time and his comments.

Strong blasts of wind caused images on the camcorder videoscreen to wobble. LeRoy drove his van in front of the scope to act as a windbreak and arranged several eyepiece cases and equipment boxes on top of the vehicle to further block the wind. That helped — the images still wavered but not as much.

Then the anticipatory waiting began. Paul turned on the video equipment about an hour before the event time; on the tiny 2 1/2 inch by 3 inch camcorder screen we could see three stars of about equal brightness, the center one of which was our target star, TYC 6336-01340. Near it was a much fainter dot - the asteroid (268) Adorea! Another brief check of the equipment a half hour later showed that Adorea had moved closer to the star.

Five minutes before the predicted time of 12:58 A.M. MDT (06:58 UT), Paul started recording as we huddled around the little videoscreen. We could no longer see the asteroid; it was lost in the glare from the star. Paul spoke into the microphone, announcing the event, place, and time, feeding in the time signal from the radio through the mike. Static drowned out the WWV time ticks intermittently and the sound repeatedly weakened while Paul moved the radio around to pick up a better signal.

At 12:57 (06:57 UT), we all practically held our breaths and almost didn't blink as the time of occultation approached. At 12:58 (06:58 UT), when the star should have "dropped out" from the sudden magnitude change — nothing happened. We saw no dimming, except possibly some slight variations in seeing. By 12:59 (06:59 UT) it was clear that we had seen no occultation at our site. Paul continued the recording until five minutes past the predicted time; our observation attempt was finished. Later Paul examined the recording frame by frame and determined that it showed a "clean miss" at our site.

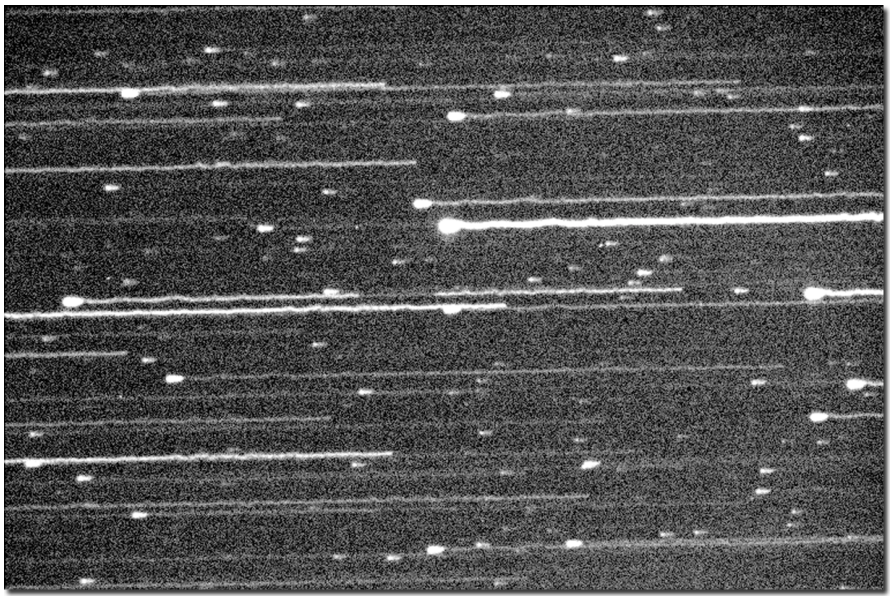

Image: © Gary Emerson, 2002

July's occultation of a star in the constellation Capricornus by the magnitude 12.6 asteroid (268) Adorea was not easy to witness. This image was taken with a 10-inch f/4.5 telescope and a HISIS 23 CCD camera. It is a 90-second exposure with 60 seconds of "trailing."

Of six other parties watching the occultation, four had successful observations. Chris Tarr, observing from Grand Lake, Colorado (105° 48′ 20 sec W, 40° 14′ 32′′ N) recorded an occultation of 9.92 seconds. Dan Durda, Dirk Terrell, and Jim Baer, at Sommers-Bausch Observatory in Boulder, Colorado (105° 15′ 46.92′′ W, 40° 00′ 12.78′′ N, 1653 meters), recorded an event of 8.133 seconds. Gary Emerson, at E. E. Barnard Observatory in Coal Creek Canyon, Colorado, recorded an occultation of 7.65 seconds. Jack Eastman, observing from his backyard in Sheridan, Colorado (39.63617 N, 105.0275 W, 1638 meters), visually observed an event lasting approximately three seconds.

Although Paul, LeRoy, and I didn't see the occultation at the missile site, it was thrilling to watch as the asteroid approached the star. Even better, the evidence of a clean miss at our site combined with reports of the four successful occultation observations add valuable information to the science of our solar system.

For more information about asteroid occultations

Visit *http://www.denverastrosociety.org/observer.html* and click on "August *Denver Observer*" to see Chris Tarr's observing report and image of the Adorea occultation. For general occultation news, visit the IOTA website at *http://www.lunar-occultations.com/iota/iotandx.htm.*

Continued on page 6

Image: © Gary Emerson, 2002

Discovered on July 14, 2002, Asteroid 2002 NY40 measures about 800 meters across. It flew past our planet on August 18, 2002 at a distance of only 1.3 times that of our moon. This 3-minute exposure was taken August 17, 2002 with a HiSIS-23 CCD camera and an 85mm Nikon lens.

Continued from page 5

For more details about how to observe asteroid occultations, visit Paul Maley's Occultation Page at http://www.eclipsetours.com/occultationa. For predictions of future occultations and information on timing strategies, visit Steve Preston's Astronomy Page at *http://www.oz.net/~stevepr/astro_h.htm.* — *Sandy Shaw has written several articles for* The Denver Observer *and has numerous Astronomical League certificates to her credit.*

Welcome New Members!

The following folks joined the Denver Astronomical Society during the last month. Welcome new members!

- **Tracie DeVries**
- **Julia Gross**
- **Dan Hupp**
- **Lisa Judd**
- **Phil Klos**

Astro-Trivia Answer

A. In the late 1700s, astronomers believed that a mathematical progression known as the Titius-Bode Law predicted the existence of a planet between Mars and Jupiter. By 1800 they began a systematic search for the "missing" planet. Calling themselves the Celestial Police, they divided the ecliptic into 24 sections, assigned a sector to each participant who was to search the area while making a new star chart, and began the work that led to the discovery of the asteroids.

Directions to the E.G. Kline Dark Site

The DAS Edmund G. Kline Dark Site is about 60 miles east of the "mousetrap" in downtown Denver.

Take I-70 east to the Deer Trail exit (exit 328), turn left at the end of the exit ramp, and turn left again on CR 217 (after the Texaco station). Take CR 217 just over 1/2 mile, and turn right (east) onto CR 34. Stay on CR 34 about 6 miles until you get to CR 241. Turn left (north) onto CR 241 and continue about 1.5 miles – you'll see a culvert with a wide gate on the right (east) side of the road.

Directions to the site from Denver, arrival from the North (for after-dark arrivals):

Take I-70 eastbound to exit 316 (Byers). Turn left at end of ramp which puts you on eastbound US-36. Take US-36 east 17.2 miles to CR 241. Turn right (south) onto CR 241 and continue for 6.2 miles. The DSS entrance is on the left between two tall posts.

Note: Travel distance from Denver using the North route is actually 3.9 miles shorter than the traditional route. The first 5 miles of CR 241 going south from US-36 is narrow and somewhat rough. Be careful.

Warming Hut Rules

- **The last people on the site must turn off the lights and the heat.**
- **A microwave will be provided for warming food. Please clean up after yourself.**
- **No pots and pans, appliances, or other supplies are to be left in the shed.**
- **No personal supplies are to be left in the shed overnight.**
- **Do not donate furniture or other things unless you clear it with the D.S.S. committee first.**
- **No food left overnight in the shed.**
- **No sleeping overnight in the shed.**
- **Quick naps are permitted if you feel you might fall asleep on the way home. We would prefer you get your nap rather than falling asleep on the road. However, we don't want it to become a tent for camping.**
- **Clean up after yourself before you leave the site.**
- **Please clean up all food that drops or is spilled, otherwise it will attract mice and insects.**

observers deck

Dark Sky Site Courtesy

Please remember that white light disrupts the eye's dark adaptation and can ruin astrophotography. Following these simple guidelines will improve the experience for all:

★ Upon arrival at the site, check to see if sign in has been instituted at the warming hut. We hope this will help alleviate problems members may be experiencing in trying to find a place to set up.
★ Drive carefully on the road, there are blind spots in the low area and you will find cattle on the road at times.
★ Try to arrive before dark.
★ If you have to arrive after dark, turn off headlights when turning into site.
★ Turn off all dome and trunk lights. If a light can't be turned off, pull the fuse, use layered red brake light tape or just duct tape over it.
★ When you drive in, position your car so you can drive out directly instead of using your back up lights.
★ Use only dim red flashlights. Never shine a flashlight in someone's face or on their scope.
★ Please wipe your feet carefully before using the warming hut.
★ Please chip in and do some cleaning up in the hut or at the observing sites. It is the responsibility of all users to keep the place nice.
★ Serious astrophotographers may wish to use the South field since it is somewhat isolated from the rest of the area.
★ If you are the last person to leave the site, turn off the lights and the heaters in the warming hut. Then, lock the warming hut and close the gate to the site.
★ Members are responsible for educating their guests as to the rules.
★ Prospective members, out of town astronomers, and others may be guests one time.
★ Members can bring family any time and personal friends on a limited basis, but should not abuse the privilege.
★ Groups of five or more guests must be cleared through the President or Vice President prior to visiting the Dark Sky Site.
★ There is no sleeping in the warming shed overnight. However if you need to nap for a short period, you can use the shed. We would rather you fall asleep there rather than at the wheel on the way home.
★ You may warm drinks in the microwave—it is not there for warming food and cooking since we have no water to clean up. If you spill, please clean up after yourself

Other Suggestions:

★ Wear warm clothing. The nights can be extremely cold in the winter and surprisingly cold in the summer.
★ Bring your own power such as a battery and/or an inverter since the power sites are limited. Also bring extension chords.

Photo: © 2002, Joe Gafford

Dan Wray and Larry Brooks get ready for the dark skies that usually embrace Rocky Mountain Star Stare. Watching are Todd Hitch and Ron Oaks (back left and right).

★ Hot drinks can help you survive the night!
★ When approaching the telescope of someone who does not know you, introduce yourself and ask before looking through the scope. Most members (with the exception of astrophotographers when they are taking pictures) will be happy to share their scopes.
★ Bring your own toilet paper in case that in the porta-potty runs out.

For Sale

C-8 Celestron System Telescope

Includes:

Original-style orange tube version carefully handled and stored in "Foot-Locker" case.

- Wedge
- Tripod
- Eyepieces
- Finder-scope, etc.

Mint Condition. Reasonably priced.

Contact Bill at (303) 674-0500 or Gordon Teall at (303) 986-0289. Gordon email: *gorddeeteall @earthlink.net.*

edmund g. kline dark site

About the Denver Astronomical Society

The DAS is a group of amateur and professional astronomers that share a mutual interest in the heavens. The DAS operates the University of Denver's Chamberlin Observatory, along with its prized 1894 Alvan Clark 20-inch refracting telescope. Our members have been involved with the first public planetarium at the Denver Museum of Science and Nature and the Smithsonian Astrophysics Observatory's "Moon Watch" program. The DAS successfully petitioned to have the Chamberlin Observatory listed on the National Register of Historic Places.

Our Credo is to provide members a forum for increasing and sharing their knowledge, to promote and educate the public about astronomy, and to preserve the historic telescope and observatory in cooperation with the University of Denver. To these ends we have established three tax deductible funds: the Van Nattan Scholarship Fund, the Chamberlin Restoration Fund, and the DAS Dark Sky Site Fund. This last fund was established in order to construct and maintain observing facilities near Deer Trail in eastern Colorado.

Please call our Info Line at (303) 871-5172 and drop by the General Membership meetings. Become a member and enjoy speakers, facilities, events, and our monthly newsletter, *The Denver Observer.*

Application for membership to the Denver Astronomical Society

New ☐ **Renewal** ☐

Name: _____

Address: _____

City, State, Zip: _____

Phone numbers: Home ( ) Work ( )

E-mail Address: _____

Occupation: _____

Other Interests: _____

(Associates Only) School: _____ Grade: _____

Do you want to download the newsletter in PDF format from our website instead of by postal mail?

Yes ☐ No ☐

Do you want the above information excluded from the yearly roster? Yes ☐ No ☐

Please Circle All That Apply:

Regular Membership: $30 Associate: $10 *(Age 22 and younger)* ..... $ _____

Astronomy Magazine/$29

Sky & Telescope Magazine/$29.95

..... $ _____

Van Nattan Scholarship Fund ..... $ _____

Chamberlin Restoration Fund ..... $ _____

Total Amount Paid ..... $ _____

Please mail Dark Sky Site donations to: DAS Treasurer, Chuck Carlson, at the address below. (Make checks payable to the Dark Sky Site Fund).

Please complete this form, or a copy, and mail it with your check or money order payable to The Denver Astronomical Society:

DAS Treasurer, Chuck Carlson; 1521 So. Vine St.; Denver, CO 80210

Denver Astronomical Society

c/o Chamberlin Observatory
2930 East Warren Avenue
Denver, Colorado 80208

September's Meeting

September 20:

Dr. David Nesvomy (Southwest Research Institute) and Chris Peterson, *"Asteroid Breakup Event in the Main Asteroid Belt."*

j o i n u s