The Denver
OBSERVER
OCTOBER 2012

ASTRONOMY DAY ALERT!

DIVERSE NEIGHBORS

Discovered in 1787 by William Hershel, the Bubble Nebula, (NGC 7635 or Caldwell 11) is an H II region emission nebula in the constellation Cassiopeia, about 7 to 10 thousand light-years from Earth. The nebula is in a huge molecular cloud which contains the expansion of the bubble as it is formed by a hot,10-40 solar mass star. This widefield image also shows the dense open cluster Messier 52. Taken with a modified Canon 450D through an AT8IN 8-inch, f/4 Newtonian. 21 RGB exposures totalling 107 minutes.

Image © Darrell Dodge

Calendar

8.....Last quarter moon
15..... New moon
21..... First quarter moon
29..... Full moon

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OCTOBER SKIES

by Dennis Cochran

A Canadian told me that Venus and Regulus (Leo's alpha star), will collide on the 3rd of this month.

Actually, they'll get really close together but Venus will not occult Regulus, nor vice-versa. At least I hope not, because the star is rather farther away than the planet. You may not get this *Observer* in time to see that conjunction since this is essentially a mid-month publication. You'll have to look for Piscis Austrinus instead, a shapely constellation southeast of Capricorn, about on a level with Sagittarius but way east of it. The Southern Fish is findable because of its bright alpha star Fomalhaut (which means "mouth of the fish" in Arabic), at the east end of the shape of a fish swimming east. And if you've ever wondered where to find Grus the Crane, it's below Piscis Austrinus.

The fish may be Venus in a Greek legend—gods were changing into animal shapes during one of their wars. Above Fomalhaut and a bit to the right lies the Helix Nebula, the largest appearing exploded star in our sky. At 1/2 degree in diameter, it's the size of the full moon, but it's rather faint, even in larger scopes. The gorgeous Hubble photos of it are full of intriguing detail. If you have access to a Hubble Heritage book, look for it whilst imagining you're in Captain Picard's ship diving through the middle of the Helix.

Over at Capricorn we found some globular clusters last month. There are a couple more we could mention down under its wide "Vee." M30 is on the left side below the left end of the "Vee," while tiny M75 is in an analogous spot on the right side; see the October *Sky & Telescope*, page 45. Both of these clusters have concentrated star-like appearances. Later the Pegasus/Andromeda mega-constellation is looming in the east but we'll discuss them next month.

Continued on Page 3

PRESIDENT'S CORNER

by Ron Pearson

"There is precious little hope to be got out of whatever keeps us industrious, but there is a chance for us whenever we cease work and become stargazers."—H. M. Tomlinson

I hope you had a good month of star gazing in September. With the reduced haze from the wildfire smoke for a few nights, I was finally able to see the Milky Way a couple of times from my yard. I heard that the Okie-Tex star party was a success, and it was reported that the new wind and photon screens that were put to use at our dark sky site are a "howling" success. October usually brings us another good month of observing before the wild ride of winter weather sets in. Autumn is also our busiest month of outreach because of Colorado Astronomy Day (CAD) at Chamberlin Observatory and the Denver Museum of Nature & Science (DMNS). We also hope to be doing some good outreach events for schools and other organizations on those early evening nights now that the kids are back in schools and fired up for science. However, in order to have successful outreach events, including CAD, we need you to participate and volunteer for a night or a few hours. Without you we shrink back into our own little views of the sky and leave the kids (or adults) to go back to their video games after briefly wondering, "What is that up there?" The DAS is also taking a stronger stand in educating folks about the effects of light pollution and the simple ways it can be prevented. We have acquired a full licensed version of the documentary *The City Dark* and hope to begin showing it at public venues shortly. Watch for coming announcements near you! You can do more than complain about those oil rig lights at our dark sky site, you can be part of the solution by doing outreach events and light pollution education. As Darrell wrote about last month, several teams of DAS members have already assisted the National Park Service in its BioBlitz Study which targets light pollution and its effects on the Front Range.

This year we close out October with our Annual DAS Auction of your used, or new, "astronomy stuff." The auction supports astronomy education and outreach because the proceeds go to our Van Nattan-Hansen Scholarship Fund for students in astronomy or the physical sciences. By bringing your used or repurposed astro-equipment you are helping educate the next generation of astronomers and scientists. So, don't let the trash-talking auctioneer lower your bids for some great buys on just about any astro-related hardware, software, books or what-not. You can put a minimum bid on your stuff and a minimum of 10% of the sale goes to the scholarship fund. This year the DAS will be auctioning several of its assets that get little use and can be put to better use in your hands while raising scholarship funds. I discussed some of these in my article last month on the "Adopt-a-Telescope Project." A brief list here includes:

- Losmandy G-11 Tripod
- JMI Wheeley-Bar Assembly (for the G-11 mount and tripod)
- Celestron C-5 (5-inch SCT telescope) with CG-3 German equatorial mount, case and accessories, in like-new condition.
- Celestron 8-inch SCT telescope—early or mid-80s vintage classic orange tube with wedge, tripod and trunk.
- Coulter Odyssey 8-inch "Red Tube" Dobsonian telescope in very good condition, with accessories.

Continued on Page 4

DAS SCHEDULE

OCTOBER

5 E-Board Meeting at Chamberlin (Begins at 7:30 P.M.)
12-14 EGK Dark Sky weekend
20 Colorado Astronomy Day at DMNS and Chamberlin Observatory (10 A.M. to 4 P.M.) and Open House (Begins at 6:00 P.M.)
27 DAS Auction at Chamberlin Observatory (Setup begins at 11:00 A.M., Bidding begins at 1:00 P.M.)
31 Hallowe'en

NOVEMBER

2 General Membership Meeting at D.U.'s Olin Hall: Members Show 'n Tell (Begins at 7:30 P.M.)
4 Daylight Saving Time Ends
9 E-Board Meeting at Chamberlin (Begins at 7:30 P.M.)
9-11 EGK Dark Sky weekend
11 Veterans Day
17 Open House at Chamberlin Observatory (Begins at 7:00 P.M.)
22 Thanksgiving (No Public Night)
28 Penumbral lunar eclipse (At moonset)

Public nights are held at Chamberlin Observatory every Tuesday and Thursday evenings beginning at the following times:
March 13 - April 14 at 8:00 P.M.
April 15 - August 31 at 8:30 P.M.
September 1 - September 30 at 8:00 P.M.
October 1 - March 10 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.

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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

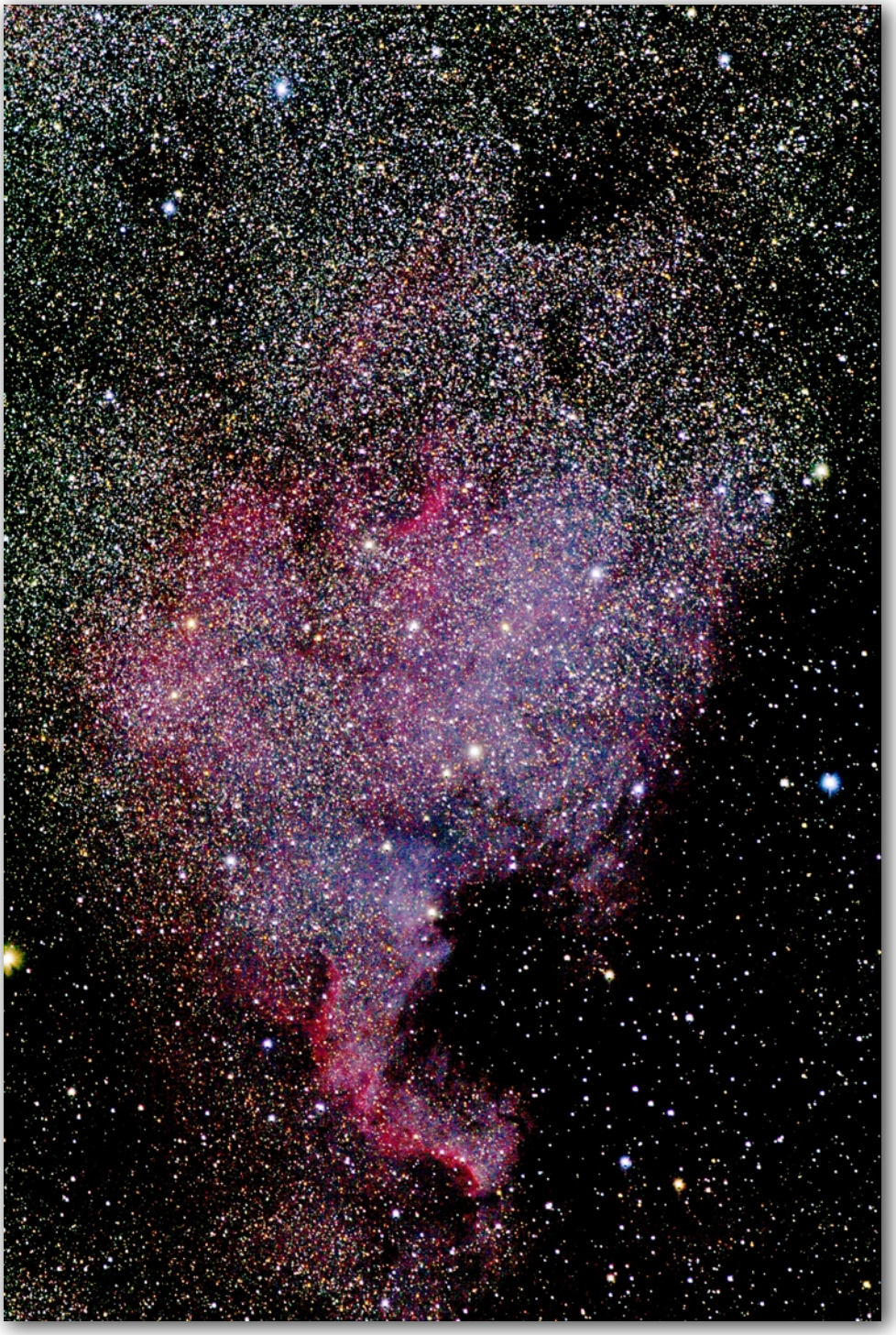
OCTOBER SKIES

(CONTINUED FROM PAGE 1)

Speaking of exploded stars and their wider-spread cousins the supernova remnants, have you seen the Veil Nebula lately? You probably can't get it into a single field, so look at the western or eastern part of its interrupted circle shape. The Veil is in Cygnus's southeastern wing just east of the double star 52 Cygni in the area southwest of the outer segment of that wing, the line Epsilon to ζ (zeta) Cygni. The heavier fragment of the Veil is right at 52 Cygni while the eastern arc is, well, east and a hair north of that. The Veil shows up especially well using an O III filter. Up at Deneb, the tail of the Swan, we have the famous North America-Pelican Nebulae pair to its east. These are difficult visual objects, much harder to see than the Veil arcs and so they tend to be imaged rather than eyeballed. Another hard-to-see object is the globular cluster M29 south of γ (gamma) Cygni, the star at the crossing of the Swan's body and wings—but remember, Messier managed to see it.

East of the Swan is Lacerta the Lizard, a vertical squiggle of dim stars near the zenith south of Cepheus. Open clusters of stars are here: at the north end of the Lizard is the lozenge of its head with the alpha star at the left corner of this thin vertical diamond. NGC 7243 is a short ways west of that. Just left of the top star of the diamond is NGC 7296, and if you'll make a line back towards NGC 7243 and a similar distance farther you'll find NGC 7209.

The Draconid meteors will peak on the 8th of this month. Sometimes this is a strong storm but it's not expected to be so this year. However, on the nights of the 20th and 21st we're in better shape to see the Orionids peaking after the midnight moonset. Starting on the 28th of the month and extending well into early November there may be Taurids, possibly quite bright, battling the moonlight. It's too bad that we can't get an exact date for these: the meteor stream is too spread out. This month the New Moon weekend will be the 13th-14th. We often enjoy lovely clear skies during the Fall, so get out there and squint!



THE NORTH AMERICA NEBULA IN CYGNUS

The North America Nebula is a mixture of emission, reflection, and dark nebula in our own Milky Way. Roger used a Canon 1D Mark II 8-MPixel digital camera, set at ISO 800 with a 500 mm f/4 IS L telephoto lens. The image was guided with an ST4 autoguider on a 3-inch f/8 refractor on a Losmandy G11 mount. More details can be found at *http://www.clarkvision.com.*

Image © Roger Clark

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-exampt 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.

More information about DAS activities and membership benefits is available on the DAS website at *www.denverastro.org.*

CELESTRON 5-INCH IN LIKE-NEW CONDITION
The C-5 will be auctioned at the Annual DAS Auction on October 27.
Courtesy Charles Habenicht

PRESIDENT'S CORNER

(CONTINUED FROM PAGE 2)

There may be other assorted eyepieces, telescope parts and possibly an astro-laptop from our vast storehouse of astro-stuff.

Let's see what you've got, because we all want more gizmos and "the right stuff" for observing or imaging. Of course, the October Auction leads into our November meeting of the members "Show and Tell" so that we can see what you've done with all that stuff you told your significant other you didn't spend much money on.

Keep looking up!—*Ron Pearson*

DAS JOB JAR

JOB JAR

Open House Ready-Mount Operator

DAS has a unique mount, owned by the club, that's handy for bringing the eyepiece to those that are wheelchair-bound. It's topped by a 127mm Orion Maksutov-Cassegrain, and the only thing missing for this setup at Open Houses is someone to run it. If you enjoy our OH's and don't need to be with your own scope, would you like to be at the center of the south-lawn circular, asphalt driveway with a glow-in-the-dark handicapped sign (unfortunately, not provided), showing nifty targets to attendees with this setup? Since Chamberlin itself isn't accessible, it'd be beneficial to have some help to accommodate these folks.

New Member Folders

Some time ago, our club used to offer a folder full of information for those new to the club and new to astronomy. Contents included a small planisphere, literature from Astronomy Magazine on how to get started, and handy coupons for S&S Optika. Not everyone who's new to our club is new to our hobby, but those that are may appreciate a folder with info. If you're semi-new yourself and have enjoyed all you've learned so far, you may want to choose handout materials to pass this info along to the next folks to be bitten by the bug.

New Astronomer's Den Mother (or Father)

In addition to having a wheelchair station at Open Houses, it's also nice to have a saved-off space for those who are new to the hobby and want to learn how to use their scopes and find targets. A great many of these folks that have recently joined have been enjoying the Dark Site near Deer Trail, but for those that are still learning constellations, a little bit of city light pollution can actually be beneficial in learning the patterns. Perfect place for laser pointers! This position could use someone who's familiar with most all types of scopes, including Go-To mounts, so as to mentor those who need a little hands-on help.

Calendar Notices Coordinator

We still need someone to submit notices for our monthly Open Houses and events to the *Denver Post's* "Your Hub" feature.

DAS STAR-GAZERS AT OKIE-TEX!
Members enjoyed the star party and gathered for a group photo! Jack Eastman is preparing his review of the star party for an upcoming issue. Photo: back row, left to right: Tim Havens, Bonnie Bailey, Dave Spillman, Jack Eastman, Jim Pequette, Paul Kaiser, Mark Levinson, Rodney Pinkney and Joe Gafford. The front row, left to right: Cathie Havens, Lisa Judd, Naomi Pequette, Christa Hammond and Dave Hammond.
Courtesy Joe Gafford

THE NIGHT SKY NETWORK (NSN)

by Chuck Habenicht (The Grumpy One), DAS Coordinator to the NSN

The DAS is a member of NASA's Night Sky Network (NSN)—a coalition of astronomy clubs across the country that provide for and promote astronomy-related public outreach events. The NSN is supported by NASA, JPL, NSF, CalTech, the Smithsonian and others, and is operated by the Astronomical Society of the Pacific. DAS is one of the NSN's shining stars when it comes to public outreach. Every year we host over 150 events that reach more than 6,000 people!

You can visit the Night Sky Network on the web at: *nightsky.jpl.nasa.gov* to discover a wealth of available information. Click on "Find Events" or "Find Clubs" to see what all of the astronomy clubs (including ours) are doing in any region in the U.S., complete with calendars of events, and night sky planners. By clicking "Astronomy Activities," teachers, students, parents and those interested in public outreach will find a treasure trove of useful information, activities and resources, including: All of NSN ToolKit information packages with activity guides, movies, Power Point presentation, videos, printable handouts and auxiliary files. The kits include fun and educational projects and activities that show how to demonstrate things such as how craters are made, how telescopes work, the hows and whys of eclipses, how far the planets are from each other and much, much more.

In addition, all of the Audio recordings of past NSN Tele-conferences and their associated Power Point presentations with auxiliary files and links are available.

NASA'S *SPACE PLACE*

DOING SCIENCE WITH A SPACECRAFT'S SIGNAL

A Space Place Partner Article
by David Doody

Mariner 2 to Venus, the first interplanetary flight, was launched August 27 fifty years ago. This was a time when scientists were first learning that Venus might not harbor jungles under its thick atmosphere after all. A Russian scientist had discovered that atmosphere during the rare Venus transit of 1761, because of the effects of sunlight from behind.

Mariner 2 proved interplanetary flight was possible, and our ability to take close-up images of other planets would be richly rewarding in scientific return. But it also meant we could use the spacecraft itself as a "light" source, planting it behind an object of our choosing and making direct measurements.

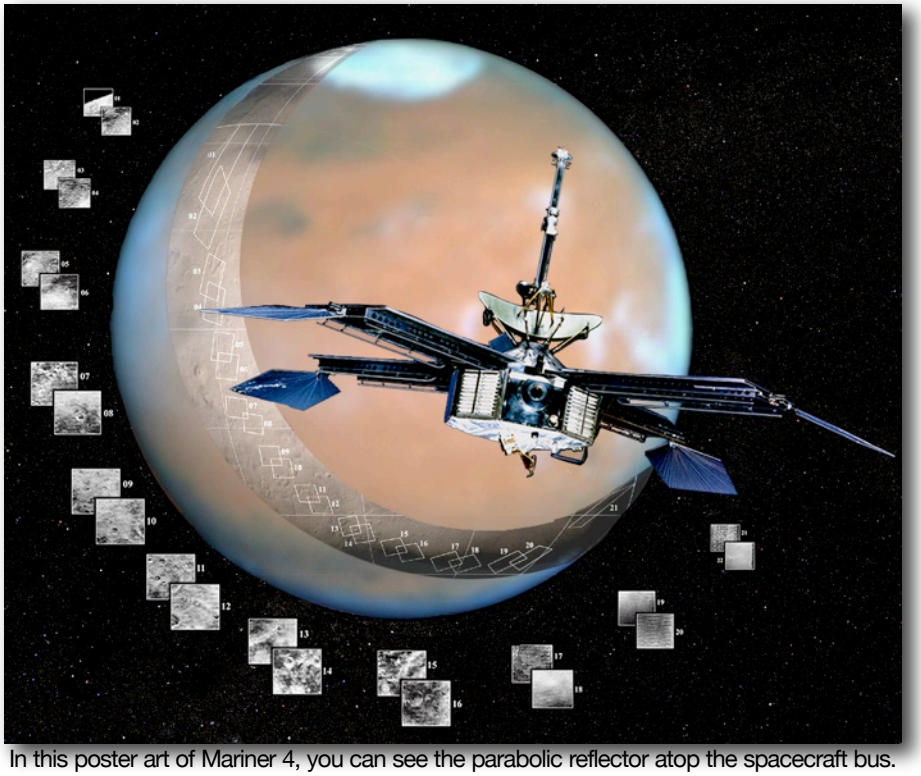
Mariner 4 did the first occultation experiment of this sort when it passed behind Mars as seen from Earth in July 1965. But, instead of visible light from the Sun, this occultation experiment used the spacecraft's approximately 2-GHz radio signal.

The Mariner 4 experiment revealed Mars' thin atmosphere. Since then, successful radio science occultation experiments have been conducted at every planet and many large moons. And another one is on schedule to investigate Pluto and its companion Charon, when the New Horizons spacecraft flies by in July 2015. Also, during that flyby, a different kind of radio science occultation experiment will investigate the gravitational field.

The most recent radio science occultation experiment took place September 2, 2012, when the Cassini spacecraft carried its three transmitters behind Saturn. These three different frequencies are all kept precisely "in tune" with one another, based on a reference frequency sent from Earth. Compared to observations of the free space for calibration just before ingress to occultation, the experiment makes it possible to tease out a wide variety of components in Saturn's ionosphere and atmosphere.

Occultation experiments comprise only one of many categories of radio science experiments. Others include tests of General Relativity, studying the solar corona, mapping gravity fields, determining mass, and more. They all rely on NASA's Deep Space Network to capture the signals, which are then archived and studied.

Find out more about spacecraft science experiments in "Basics of Space Flight," a website and book by this author, *http://www2.jpl.nasa.gov/basics*. Kids can learn all about NASA's Deep Space Network by playing the "Uplink-Downlink" game at *http://spaceplace.nasa.gov/dsn-game*.



In this poster art of Mariner 4, you can see the parabolic reflector atop the spacecraft bus. Like the reflector inside a flashlight, it sends a beam of electromagnetic energy in a particular direction.

Credit: NASA/JPL/Corby Waste.

GEAR UP FOR COLORADO ASTRONOMY DAY!!

by Ron Pearson

October 20th is Colorado Astronomy Day and we will be setting up our solar telescopes and outreach table at DMNS again this year, followed by the Open House at Chamberlin in the evening. We can always use white light or H alpha solar scopes and plenty of folks to meet and greet at our table in Space Odyssey. We also need a couple more short talks on astronomy topics during the day in Space Odyssey. Send me an email or post it to our yahoo group if you'd like to help out. We go from about 9 A.M. until about 4 P.M. at DMNS Space Odyssey. IF there are enough volunteers for the outreach table you can take shifts and tour the museum or see an IMAX film.

But wait, there's more! As has been a tradition now, those that volunteer for both DMNS and Chamberlin Open house will get a pizza dinner in addition to the DMNS lunch coupon! So if you will "observe for food" this is your chance! But we need you to sign up so DMNS security forces don't blow up your telescope. If you can't make the daytime activities at DMSN, be sure to come to Chamberlin Observatory for the night of Astronomy Day. We hope to have some special activities there too so watch your email for further announcements.

Colorado Astronomy Day entices many folks to get together and look up! Activities begin at the Denver Museum of Nature & Science, and finish up with an open house at D.U.'s Historic Chamberlin Observatory. Photos (from last year's Astronomy Day at the museum) clockwise from upper right: Dan Wray shows off the Sun with his double scope rig at DMNS, DAS Solar Astronomers get set up on the west patio of DMNS on CAD 2011 (Dave Tondreau in foreground, Ron Hranac on left, Dan Wray on right) and science teacher Tony Bryant and a family get a good look at the Sun with Ron Hranac's solar scopes.

Credit: Ron Pearson

BEGINNERS BITS— METEOR SHOWERS

by Lisa Judd

Here's an activity that anyone with a clear night sky can enjoy, regardless of astronomical knowledge: shooting stars or meteors. A meteor is a small piece of space dust that burns up in the Earth's upper atmosphere, causing a bright trail as it vaporizes. A meteor shower happens when the Earth passes through a known stream of small pieces of space dust that also orbit the sun, collectively and continuously throughout the entire orbit. On any clear night with no expected shower, we can expect to see "background sporadics" every half-minute or so. When a meteor lands somewhere on Earth it becomes a meteorite. Bright ones are called "bolides," but it's rare for anything large to hit the ground as a meteorite. Man-made space junk can also re-enter the atmosphere.

Meteor showers occur on the same date or set of dates each year because the Earth passes through a debris stream on a certain day as it goes around the sun (varying with the leap year). The streams are left behind by comets as they come near the sun, heat up, and shuck off their material; some so large that a meteor "shower" can last up to a month, with a peak date. Yes, that means that a meteor shower's parent comet could eventually hit Earth, but with an orbit 100 – 10,000 years long, what are the chances that Earth would happen to be at that exact spot in its orbit at the same time the comet comes along?

If you watch meteors during a shower, you can trace their paths backwards and see them intersect in a point, called the "radiant." Although seen all night, the show gets better when the radiant is in the sky, so you may have to wait for it to rise. Most meteor showers are named for the constellation the radiant appears in. There are two in Aquarius; one is the same stream as the Orionids and parented by comet Halley. They seem to have personalities, too - Perseids (Aug 13/14) are usually slow-fliers with long, red, double trails; Leonids (peak Nov. 17) are yellow and fast with fat trails; and Geminids (Dec 12) are white and zippy with no trails. Geminids come from an asteroid rather than a comet, so lower water content may explain the lack of trails.

Perturbations from larger solar system objects cause meteor streams to move around in space, so old showers die out and new ones get born. The Perseids parent Swift-Tuttle's orbit no longer intersects with Earth's, so the Perseids will never storm again and get sparser every year. Shame; they used to be a basic staple of summer camping. But, a new one parented by comet Hartley is gaining fame every March. As long as the stream keeps getting replenished in the right place in space, then meteor showers can turn into meteor storms—some with amazingly higher rates.

Perhaps nowhere is this difference so well-pronounced as with the Leonids. The parent comet, Tempel-Tuttle, is so degraded that it's hardly a comet anymore—just a bunch of gravitationally held stuff that lives out by Uranus's orbit. Ordinarily the Leonids are very boring, but every 33 years, the cloud lengthens into a stream, zips by Earth and re-coagulates out in the outer fringes. That year, the Leonid storm gives many meteors all at once, visibly coming out from the radiant in Leo's head, and bright enough to light up the landscape. They were prominent in 1998 and 1999, but the stream split so we saw some good ones again in 2001 and 2002.

FIRST SCREENING OF *THE CITY DARK* IN LITTLETON

by Darrell Dodge

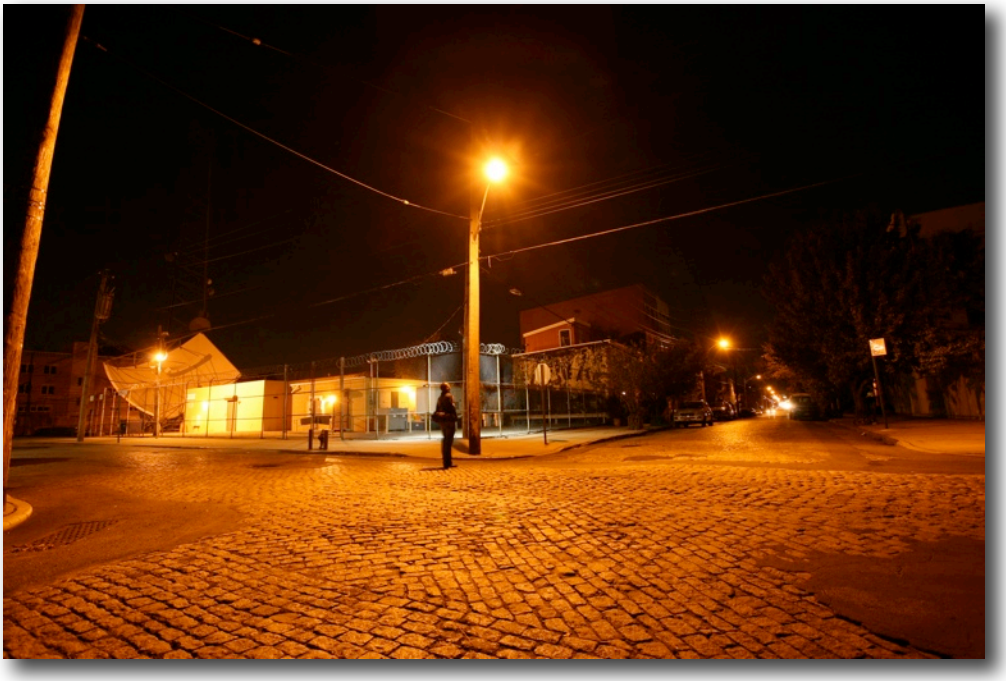
The DAS is teaming with the JustAct Environmental Committee of the Columbine Unitarian-Universalist Church to present the full-length version of *The City Dark* at CUUC on Wednesday Evening, **October 17th, starting at 7 P.M**. The church is located at 6724 South Webster St. in Littleton, one block west of the intersection of Coal Mine and Pierce. This event is planned by a team led by new DAS member Justin Modra to be the first of many screenings along the Front Range.

The City Dark explores the consequences of the loss of dark skies on man and his environment from astronomical, biological, medical, and spiritual perspectives. After moving to NYC from rural Maine, filmmaker Ian Cheney was disturbed that his move meant that he lost his cherished view of the Milky Way at night. He decided to explore and film the answer to a simple question: Do we need the stars? His journey took him from Brooklyn to Mauna Kea, Kitt Peak, Paris, and many other places depicted in the film.

Cheney's film not only explores the impact of light pollution on astronomical observing (by amateurs and professionals), but also the impacts on wildlife (hatching turtles along the Florida coast and light-confused birds on Chicago streets); human health (increased breast cancer rates from exposure to light at night); and a generation of children who have never seen the Milky Way. Featuring stunning astrophotography and a cast of eclectic scientists, including Neil Tyson deGrasse, *The City Dark* is the first film to document the story of light pollution and the disappearing stars.

Information about dark-sky-friendly lighting will be presented by Justin Modra. DAS member Pam Chadbourne will discuss the status of local efforts to protect dark skies in Littleton and the Denver area. The preliminary results of the recent BioBlitz light pollution survey along the Front Range and in Rocky Mountain National Park will also be presented.

The showing is free of charge. Refreshments will be available to purchase during a short intermission.



The City Dark poses the question, "What do we lose, when we lose the night?" This image is from the film and was shot in Brooklyn, NY.

Courtesy: Wicked Delicate Films

THE RUNNING MAN

The Running Man reflection nebula (NGC1977), the uppermost of three dim naked-eye "stars" in Orion's sword, is associated with the open cluster NGC1981. This image depicts the pair inverted, with the edge of M43 at the top. Portions of H II emission areas shine through the gas cloud, creating the man's body -- still running, but somewhat different than the non-inverted view. Dark dust clouds create blue reflection nebulae around stars in NGC1981. Obtained September 15, 2012 at the EGK Dark Site, Canon 450D, subexposures of 5x60s, 10x120s, 6x180s, through an AstroTech AT8IN 8-inch f/4 Newtonian.

Image © Darrell Dodge

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