

# OBSERVER



### BABY, IT'S COLD OUTSIDE !

Ah, but the wonderful company, good food and Bryan White's always-superb show certainly warmed the spirits at the annual DAS Holiday Potluck last December.

*Image copyright 2008—Darrell Dodge*

... and, as luck would have it, on the very same night . . .

### A VALIANT EFFORT, INDEED

Needless to say, 51 candles presents quite the challenge in the "blowing out" category of life's events, but VP Keith Pool gave it his **all** on his birthday — rumor has it he got **all** but 50 of them.

HBD, Keifer.

*Image copyright 2008 — Darrell Dodge*



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## FEBRUARY SKIES by Dennis Cochran



**S**undown at month's beginning sees Pisces take a dive past Venus, trying to get back to the water. At the end of January, Venus and the crescent moon are low in the west at sundown and right below them is the cirlet of Pisces. If you arc to the south following the right side of the Pisces "V" down to the alpha star at its point you will be pointed at Mira the Wonderful, the first star to be noticed as a variable. Mira is in the next constellation east, Cetus the Sea Monster, who appeared briefly last month in our account of the Andromeda story. Cetus also has a cirlet for a head, located just west of another "V", the one of Taurus. Spiral galaxy M77 is underneath the cirlet just southeast of the delta star in the neck of Cetus. This large faint galaxy is the prototype for the Seyferts, which have bright, almost stellar-looking cores indicative of massive black holes with bright accretion disks. Carl Seyfert identified this class of galaxies in the 1940's before black holes and accretion disks were known.

Wandering southeast, one has to cross Eridanus the River, whose twisting course starts just northeast of Rigel to flow down toward Fornax and over into the southern sky, through regions rich in galaxies, to its end at the alpha star, Achernar. We cannot follow it that far, so we wander east under Orion to Lepus the Hare and on to Sirius in Canis Major. If you can see all of Lepus, look for the rare winter globular cluster M79 south of Lepus' middle. Similarly, the star cluster M41 is not far south of Sirius. M41 is a rich binocular object, one of the visually finest of star clusters. While you're in that region don't forget to rise up to find the famous nebula, M42, in the sword of Orion. Just above it, the belt of Orion is surrounded by the loose stellar association, Collinder 70, a good binocular object. Now go back to Sirius.

Several more clusters are down here: M46 and 47 are in an open area a ways to the left of Sirius, while south of them, down by Puppis, one finds M93. *(continued on page 3)*



# PRESIDENT'S CORNER

The February Elections are next on the agenda, followed by the Spring Banquet, with guest speaker, Dr. Roger Clark. The banquet will be at the Columbine Unitarian Universalist Church starting at 6:00 p.m. -- a great venue. Directions and details appear on the back page of this edition and on the website.

The nominating committee has been set and includes Wayne Kaaz and Dennis Cochran. Feel free to volunteer yourself or any other member for high office. The Board is composed of 8 members at large, 4 officers and 1 Past-President. I will not be running for President this year, so I will automatically be on next year's board, as per our bylaws.

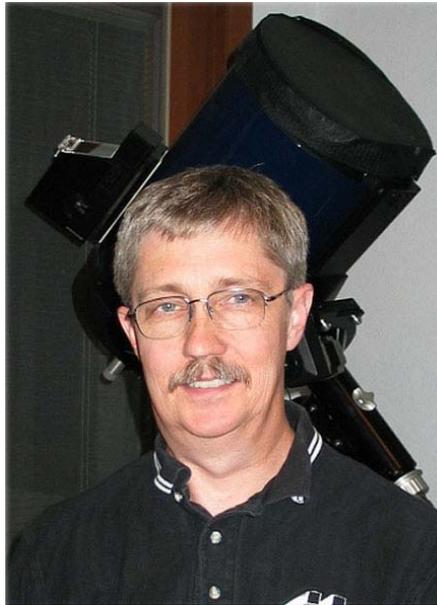
February's General Meeting speaker is Dr. Doug Duncan from the University of Colorado's Somers Bausch Observatory. He and Jack Eastman harken back to overlapping days at the Griffith Observatory. Doug is a very dynamic speaker - some of you will remember he addressed our Spring Banquet several years ago.

Membership renewals may seem a tad confusing as we move from the anniversary date to the annual all-at-once date. You should have received a renewal notice that pro-rates your remaining anniversary time to meet the new year. Please use the form we sent to you, as it has the correct amount for your dues for the year! This move will greatly reduce the time the Treasurer spends dealing with dues.

Speaking of dues and income, it costs us around \$13.00 per person to mail a black and white copy of the newsletter. A color version is always available to everyone on the WEB site. The version on the WEB is small enough to download. Please remove your name from the paper mailing list if at all possible. Many clubs are moving to a

download exclusively. Another trick to acquire a paper newspaper is to come to Open House or the General Meeting!

We are definitely seeking people to join the Public Outreach Teams. Thanks



**DAS President, Wayne Green**

to the Department of Physics and Astronomy and the University of Denver, we are one of the most active clubs in the world with our outreach. We ask that people who want to learn how to operate the historic Clark-Saegmuller telescope devote at least two nights per month to the activity. We have a lot of fun ourselves during these evenings. Please contact either Ron Mickle or myself about joining the teams.

Speaking of Chamberlin Observatory, the work there is complete, for the interim. You may notice the addition of picture rails along the walls of the main floor. These will support various information especially related to the International Year of Astronomy. Contact Dr. Stencel, our IYA committee chairman, with ideas. We have limited funds available for these projects!

Personally, I am hoping to get back to my science next year. We have several programs we are considering, including the infrequent eclipse of Epsilon Auriga. Now is the time to practice with the star and refine the techniques. The eclipse may have already started when Auriga returns to the morning sky later in the Summer.

Keep your eyes on the skies!  
-- Wayne

## Society Directory

**President:**  
Wayne Green (303) 530-1023

**Vice President:**  
Keith Pool (303) 718-7273

**Secretary:**  
Ron Pearson (303) 670-1299

**Treasurer:**  
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Jack Eastman	Ron Mickle
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### Committees

#### Van Nattan-Hansen Scholarship Fund:

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P.O. Box 150743  
Lakewood, Colorado 80215-0743

#### EGK Dark Site Committee:

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#### IDA Representative:

Dr. Robert Stencel  
*email: coloida@hotmail.com*

#### Public Outreach Committee:

Ron Mickle, Chair  
Bryan Wilburn,  
External Outreach Coordinator  
*email: bwilburn@4dv.net*

**Student Astronomy** — Naomi Pequette, Chair

#### ALCor:

Darrell Dodge (303) 932-1309

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The Denver Astronomical Society  
Chamberlin Observatory, c/o Wayne Green  
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Denver, Colorado 80210

*The Executive Board conducts the business of the DAS at 7:30 p.m. at Chamberlin Observatory. See the DAS Schedule on the back page for dates. All members are welcome to attend.*

**[www.denverastro.org](http://www.denverastro.org)**



**It has begun** — the most ambitious campaign for public awareness in astronomy ever conceived. Years in the making and brilliant execution will make this project the epitome of science-to-the-public experiences. Here are the eleven **Cornerstone Projects** already engaged and to come:

*100 Hours of Astronomy* — *The Galileoscope* — *Cosmic Diary* — *The Portal to the Universe* — *She is an Astronomer* — *Dark Skies Awareness* — *Astro & World Heritage* — *Galileo Teacher Training Program* — *Universe Awareness* — *From Earth to the Universe* — *Developing Astronomy Globally.*



**GET THOSE DAS RENEWALS IN TODAY!**

Thanks to all of you who have sent in your membership renewals for 2009. As of early January, about 40% of present DAS members had renewed. But that means that there are still about 200 members who have not yet managed to extract the mailing from the piles of holiday junk mail, fill out the renewal and donation form, write a check to the DAS (and perhaps the Dark Site Fund), find that last remaining holiday stamp to affix to the envelope pre-addressed to Brad Gilman and schlep it out to the mailbox.

Here's a thought: **Do it NOW!**

Next year, the renewal process should be simpler for most of us, and you won't have to guess when you need to renew. Plus, the DAS treasury will not be drained by the need to send renewal forms and reminders out over the entire year.

Another benefit of the new universal January 1st renewal date will be a membership roster that doesn't change significantly from month to month. We will endeavor to have the 2009 edition of the roster (including blank pages for revisions and notes) available at the Spring Banquet.

In the meantime, if you have a question about your renewal, please don't hesitate to email me at: [dmdodge@aol.com](mailto:dmdodge@aol.com) or Brad Gilman at: [brad\\_g\\_80110@yahoo.com](mailto:brad_g_80110@yahoo.com).

Thanks to all — Darrell

**FEBRUARY SKIES** (continued from page 1)

Back at M46/47 is M50, making a triangle with them and Sirius. Now imagine a longer triangle with one long side connecting Sirius to Procyon in Canis Minor. The third corner is southeast of Procyon, marked by the cluster M48.

I don't have to remind you that Venus continues to dominate the sunset. On the 27<sup>th</sup>, the crescent Luna visits her to vie for honors as Queen of the night. Among the other planets, Saturn is back for late-evening observers who stay out as late as ten, but it will

rise earlier as the month wears on. The rings are nearly edge-wise now.

Because January had two Open Houses, February has none, but there will be one on March 7th. February does have a General Meeting on the 6th. We are scheduled to host General Pridmont Fnerm of the 3rd Galactic Corps to hear his tales of fighting the Klingons -- or am I getting this meeting mixed up with the Flying Saucer Jamboree?

- Dennis Cochran

**Long time friend, Dr. Roger Clark, to speak at the Annual Banquet**

by Keith Pool



Dr. Roger Clark will present "*Composition, Geology and Origin of Saturn's Rings and Satellite Surfaces; Highlights from the Cassini Mission*" at the Annual Spring Banquet on March 14<sup>th</sup>.

Dr. Clark received his PhD in Planetary Science from MIT in 1980, and is currently a senior scientist with the U.S. Geological Survey in Denver. His current projects include work on 3 active spacecraft missions. He is a NASA Cassini Science Team Member with the Cassini Orbiter and Infrared Mapping Spectrometer, specializing in compositional

mapping of solid surfaces in the Saturn system, such as the satellites and rings. He is also a participating scientist on the Compact Reconnaissance Imaging Spectrometer for Mars (CRISM) on the Mars Reconnaissance Orbiter, which is currently orbiting Mars. Finally, he is a co-investigator on the Moon Mineralogy Mapper instrument on the Chandrayaan-1 lunar orbiter, mapping mineralogy and searching for volatiles on Earth's Moon. He was also a co-investigator for NASA's Mars Global Surveyor, which mapped Mars from 1997 to 2006.

An avid amateur as well as professional

astronomer, Dr. Clark wrote "Visual Astronomy of the Deep Sky", which showed new ways and presented new ideas on how to observe deep sky objects, smashing some of the myths associated with deep sky observing. His other interests include photography, and his photographs may be viewed at :

<http://www.clarkvision.com>.

His reviews of digital camera sensor performance can also be found at this site.

**Nominations of Executive Board Officers and Trustees for 2009**

**OFFICERS**



**PRESIDENT:**  
Ron Mickle



**SECRETARY:**  
Ron Pearson



**VICE PRESIDENT:**  
Keith Pool



**TREASURER:**  
Brad Gilman

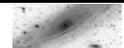
Nominations for Officers and Trustees are open until the General Meeting on February 6th, when elections will be held.

To nominate someone (or yourself) for a position, please contact:

Wayne Kaaz (303-840-1549)  
or  
Dennis Cochran (720-870-0465)

**TRUSTEES**

- Jack Eastman
- Joe Gafford
- Ivan Geisler
- Frank Mancini
- Bill Ormsby
- Tim Pimentel
- Norm Rosling
- David Shouldice
- Steve Solon
- Dan Wray



# ARCHAEOASTRONOMY of the CHACOAN PUEBLO



by Ron Mickle

*Due to the length of this informative piece, it will be spread over several issues. Many references and citations are used; contact Ron for a full listing. — Ed.*

There are many celestial events that can be studied at Chaco Canyon, such as the supernova of AD 1054, the solar eclipse of 1097, and the possible viewing of the coronal mass ejections visible around the lunar limb. This paper, however, will focus on using the archaeological evidence left by the ancestral Puebloan peoples in the area of Chaco Canyon, New Mexico, comparing and contrasting data for solar alignments and observing sites with the evidence for lunar alignments and observing sites.

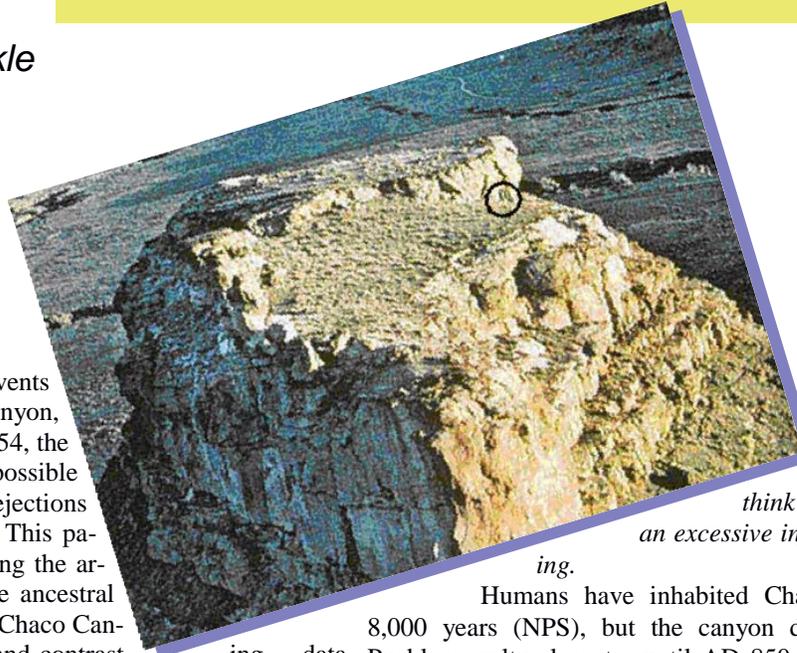
To achieve an acceptable sampling, I have chosen to rely on three major archaeoastronomy teams/authors: Malville, the Solstice Project, and Zeilik, with numerous additional references as supporting documentation. Analyzing the available research data, I will discuss the findings and explain the differences in demonstrated intent and use of various observing sites within Chaco Canyon, versus their plausible intent and use. Dependent upon the source, there are between nine and fourteen major dwellings in Chaco Canyon and numerous smaller ones (Lekson et al. 1993; Sofaer 1994, 1997; NPS; Charbonneau et al.).

## 1. BACKGROUND

Major dwellings in Chaco Canyon are referred to as Great Houses and several, such as Pueblo Bonito, Una Vida, Peñasco Blanco and Chetro Ketl, contain as many as seven hundred rooms and numerous kivas (Sofaer 1994, 1997).

Kivas are predominantly found within the Great Houses and are uniquely recognizable by their circular form. Kivas are semi-subterranean structures that may be small or large. Some scholars believe kivas were used only as ceremonial chambers and cite as evidence the modern pueblo's use of them. Other researchers contend they were used in a more routine manner, as shown by the large number of round rooms found in the great house sites. In any case, kivas were an important architectural feature in Anasazi structures and are still important components of modern pueblos (NPS). When a kiva is considerably large it may be referred to a Great Kiva, such as Casa Rinconada, which is located approximately 0.6 kilometers (km) south of Pueblo Bonito and Chetro Ketl.

*NOTE— Andy Munro, who critiqued this paper commented that*



*modern Pueblos (Hopi, Acoma, etc.) find the term Anasazi offensive. He added, and I agree, that some of us think political correctness is an excessive influence in academic writing.*

Humans have inhabited Chaco Canyon for at least 8,000 years (NPS), but the canyon did not become a major Puebloan cultural center until AD 850. This coincides with the construction of the first of the great houses, such as Pueblo Bonito and Chetro Ketl. Chaco Canyon Puebloan peoples, or “Anasazi” flourished there until AD 1250 (NPS). During AD 850 and 1250, the Anasazi built large great houses, which are theorized to incorporate solar and lunar alignments.

As we'll discuss, the Anasazi's ability to anticipate the solstices and other celestial events is due in no small part to their attention and understanding of cardinality, which is well documented in their buildings. For example, we see it in the precise north-south-east-west alignments of walls, the sun's rays illuminating parts of walls and the general cardinal layouts of the great houses. We should note that during the period AD 900-1200, the pole star Polaris subtended an angle greater than 5° from true celestial north (Malville & Putnam 1993) and most construction took place in the canyon after AD 1080, with the exception of Pueblo Alto's north wall, which was constructed prior to AD 1080 (Lekson et al. 1993). Therefore, the Anasazi had to develop some other means to cardinally align their structures, such as a *gnomon*.

The gnomon was used by several cultures around the world for determining the length of the year and the time of the solstice and can be used in determining true north. Of course, to avoid the problem of parallax, it is preferable for the observer to use features on the horizon far away. This type of observing forms the basis of horizon calendars, which also represents the most common practice of Pueblo people today, and to some degree their ancestors the Anasazi (Lekson et al. 1993; Charbonneau et al.).

To ensure the correct dates, or period of time for celebration, a calendar with some degree of accuracy would have been necessary. It is possible that for important events such as festivals and other rituals, a solar-lunar based calendar would have been developed (Lekson et al. 1993). *(continued on next page)*



What would the primary motivator be for calendar creation? Is a calendar nice-to-have or mandatory for a culture such as the Anasazi?

There is one last item that needs addressing to fully understand the debates surrounding the hypothetical intent of the Anasazi in applying the system of solar or lunar shadows to the solstices or equinoxes. The terms *predictor* or *anticipatory*, versus *calendar* and *calendrical* are used throughout documents by scholars to denote a pending event, such as the winter solstice. Definitions and explanations are provided (Squires 1999) in various documents for terms such as anticipatory observations, calendrical sites, horizon calendar, sun watching stations, sun shrines and sun portals, to mention a few. Primarily, it comes down this: a calendrical marking may be associated with a mountain range where an observer can absolutely state that the sun is only at the notch or mountain peak at a certain time of the year. These dates can be spread out along the mountain range to provide dates leading up to the solstice; thus, the mountain range serves as a calendar. When the solstice approaches, the sun's movement along the mountain range is much smaller (discussed later), so a more refined method is used, such as the spiral petroglyph on Fajada Butte (also to be discussed later) to predict or anticipate the solstice in the coming weeks leading up to the solstice.

Both Malville and Zeilik (Malville & Putnam 1993; Squires 1999; Zeilik 1983, 1984) have applied these terms as I just described and I will do likewise. The various authors and research teams have used the terms interchangeably (Sofaer et al. 1979; Sofaer 1994, 1997; National Geographic 1982, 1990; PBS 1997) and I believe this leads to some confusion when rendering conclusions

## 2. SOLAR AND LUNAR ALIGNMENTS

The Chacoans, like many agrarians, set their ceremonial and planting calendars by the solar cycles. To monitor the seasons and the solar progression, the Anasazi established observation posts throughout Chaco Canyon. Some of the observation posts were located adjacent to or within the major dwellings, while others, such as Fajada Butte, were located well outside the great houses (National Geographic 1982, 1990).

Of all the individuals and groups who have studied the Chacoan Pueblo, one of the most visible is the Solstice Project, founded by artist Anna Sofaer. The documentation that this group has amassed since starting in 1978 (NPS; Sofaer 1994, 1997; PBS 1997; Sofaer et al. 1979) is considerable. The largest amount of research by the Solstice Project has been on Fajada Butte and the phenomenon referred to as the Sun Dagger, a phrase coined by Sofaer.

### 2.1 FAJADA BUTTE

(Sun Dagger)

Fajada Butte is a large promontory located in the southeast area of Chaco Canyon, approximately 1.5 km south of the great house Una Vida. The main items of interest to archaeoastronomy are the three stone slabs located approximately 10m from the top of the butte. Early studies supported the theory that the stones were placed in their current positions by humans (Sofaer et al. 1979), but this theory has been dismissed by most subsequent studies. Each stone has been calculated to weigh 1,000 kg (Charbonneau et al.).

1— A shaft or pole placed vertically in the ground. The shadow cast by the gnomon at various times of the year could be used to determine the length of the year or geographic north.

Fig. 1.  
Aerial view of Fajada Butte. Note the circle identifies the three slabs used to mark the solstices, equinoxes and lunar standstills. March 5, 1999 (Rice University)



The Solstice Project asserts that three rock

slabs near the top of the butte collimate light so that markings of shadow and light on two spiral petroglyphs indicate the summer and winter solstices, the equinoxes, and the lunar major and minor standstills (Fig 2). When the moon reaches its maximum northern or southern declination, it is at a standstill, similar to that of the sun at solstice. Due to the gravitation effect of the sun, the moon precesses at a period of 18.61 years, with the major following the minor standstill 9.3 years later. Studies conducted since the discovery by Sofaer, et al., support the interactions of shadows on the spiral petroglyphs. As to dating the petroglyph, there is a presence of the Mesa Verdeans on Fajada Butte, so dating the age of the Sun Dagger petroglyph is difficult and leaves open the question whether or not the Sun Dagger is contemporary to the phenomenon of Chaco Canyon (Malville & Putnam 1993). Pottery shards excavated at the base of the butte indicate Fajada Butte was at least visited as early as the start of the 10<sup>th</sup> century, which predates the Chimney Rock Pueblo, discussed later, by two centuries (Charbonneau et al.). I mention this because there is evidence that attention given to the lunar standstills at Fajada Butte was inspired by the moonrises at Chimney Rock (Malville & Putnam 1993).

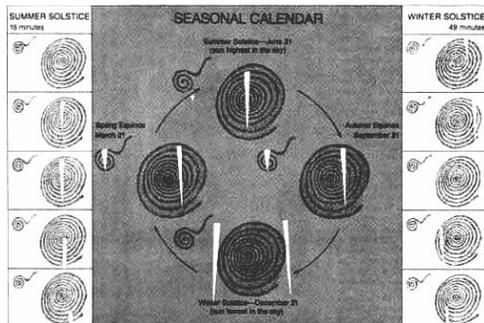


Fig. 2.  
Schematic showing hypothetical seasonal calendar. At top moving clockwise depicts Summer solstice, Autumn equinox, Winter solstice and Spring equinox. (Solstice Project)

The phenomenon of the Sun Dagger occurs during the solstices and equinoxes. In addition, the shadow cast by the moon during the major and minor lunar standstills on the petroglyph is quite remarkable (Sofaer 1994, 1997). The complete lunar cycle of 18.61 years, which corresponds to successive major standstills, may be reflective in the spiral petroglyph's 19 grooves (Fig 3). It takes the moon 9.3 years between the minor and major standstill. During the major standstill, the shadow of the moon touches the left outer groove of the petroglyph, while the lunar shadow bisects the spiral during the minor standstill. Therefore, the three-slab site serves as an anticipator of the coming standstills (Malville & Putnam 1993; Sofaer 1994, 1997).

It is also possible that the Anasazi's knowledge of the 19-year lunar Metonic cycle may be reflective in the (continued)



19 grooves of the petroglyph (Malville & Putnam 1993). There is a small groove cut in the place where the moon's shadow bisects the spiral during the minor standstill and a groove on the left edge of the petroglyph where the moon's shadow touches the spiral during the major standstill. Both grooves are cut parallel to the moon's shadow and at such an angle as to accommodate the shadow. The angle of these two grooves differs from the groove of the spiral petroglyph (Malville & Putnam 1993).

Unlike the sun, with its annual cycles of solstice and equinox, anticipatory observations for standstills would have to be carried out several years ahead of the event (Zeilik 1983, 1984), and even then, the moon's movement along the horizon would be very small as the standstill approached. This makes using the Sun Dagger site to monitor the lunar standstills more accurate and user-friendly.

Some scientists have pointed out that while the modern Pueblo show great interest in the lunar phases for time-keeping and annual calendrical purposes, they have little or no interest in the longer lunar cycles (Charbonneau et al.). We do know that the moon is important to the Pueblo (Malville & Putnam 1993). I would counter-argue that present-day Pueblo are victims of the modern information age and it is possible that ancient practices, such as observing the lunar standstills, have been either lost or have become more diluted with each generation. The metonic cycle was also observed by prehistoric inhabitants of northern Europe, as indicated at Stonehenge, other megalithic observatories, as well as the recumbent stone circles of Scotland (Malville & Putnam 1993).



According to a paper (Rice University) attributed to Rice

University, Zeilik is quoted as saying, "average daily motion of this light image during the month prior to the summer solstice is about 1mm --

Fig. 3. Photograph of the spiral petroglyph on Fajada Butte, June 23, 1978. Note the 19 grooves, counted l-r. (Solstice Project)

- the thickness of a dime. The shaft moves horizontally a total of only 2 mm in the four days centered on the summer solstice." This website appears afflitive in its comments regarding the sun dagger and Sofaer, while trying to give the appearance of validity. However, the quote attributed to Zeilik appears to be correct regarding the amount of the sun's movement closer to the solstice (Squires 1999). Sofaer comments that a shift of the light shaft during the solstice of 2 mm can be detected by comparing photographs (Sofaer et al. 1979).

There is little doubt about the correlation of the sun's ray onto the spiral petroglyph during the solstices and equinoxes, but I question whether or not the combination could have been used as a pure calendrical marker for the solstice using the naked eye. As Malville points out, due to the difficulty in ascending the Butte, the three-slab location with sun dagger phenomenon is more likely a shrine than a place of calendrical purposes. He states further that aids used in determining the solstices and planting cycles are usually kept near populated areas for easier monitoring (Malville & Putnam 1993). It is possible that shelter was available at the base of the butte (Charbonneau et al.; Sofaer et al. 1979) for the priest to use during the weeks prior to the solstice.

### 2.2 CASA RINCONADA

The great kiva of Casa Rinconada has been referenced and studied for more than 70 years and is a good example of a Chacoan structure whose cardinal alignments have been associated with the summer solstice. As with other major structures in Chaco Canyon, the building's alignment to the four major cardinal directions of north, south, east, and west were probably intentional and not coincidence. When the north axis is extended, it connects with the great houses of Tsin Kletzin and Pueblo Alto (NPS).

Part 2 of Ron's exceptional and exhaustively researched article will appear in the March **OBSERVER**



## 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 a 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: [www.denverastro.org](http://www.denverastro.org).)

More information about the DAS, its activities and the special tax-deductible funds is also available on the DAS website at:

[www.denverastro.org](http://www.denverastro.org)





# DAS IMAGERS' GALLERY



All images are © the credited imagers.



### *On the Merge* >>>

Galaxies IC 2163 and NGC 2207 in Canis Major are getting to know each other quite well. IC 2163 (left) is a discovery of Chamberlin Observatory's first Director, Professor Herbert A. Howe, who found the spiral with the 20-inch Clark refractor on February 11, 1898. Joe Gafford imaged the two at the EGK Dark Site on October 29, 2008 through his 18" Newtonian and ST-2000XM CCD camera. LRGB exposures of 10 minutes each.



### <<< *The other side of the Princess*

Across the lines of stars that form Andromeda the Princess from M31 lies the mighty Triangulum galaxy, M33 (NGC 598). At an accepted distance of 2.87 million light years, M33 ranks as the third largest galactic system in the Local Group and may be gravitationally linked to M31. Steve Solon imaged Messier's 33rd in six hours with an 80mm refractor and Custom Scientific filters.



### *From the archives of high resolution film* >>>

T'was a time, long before digital, when the romance of astrophotography involved long hours, in sometimes freezing air, patiently guiding a telescope while photons of light left their impressions on gas-hypered film. Let us, then, harken back to 1982, when Wayne Kaaz used a 4 inch, f/6 Aerial camera lens to record Antares and M4 on hypered Kodak Tech Pan 2415, exposing (and guiding) for 1.25 hours.



# DAS Schedule

## FEBRUARY

- 6 *General Meeting at DU's Olin Hall, Room 105 (7:30 pm)*  
*Speaker: Dr. Doug Duncan*  
*— E-Board elections —*
- 9 *Full Moon*
- 13 *E-Board Meeting (7:30 pm)*
- 20-21 *EGK Dark Site weekend*
- 24 *New Moon*

*(There is no Open House scheduled for February)*

## MARCH

- 7 *Open House at Chamberlin Observatory*
- 10 *Full Moon*
- 13 *E-Board Meeting (7:30 pm)*
- 14 *DAS Spring Banquet >>***  
*(speaker: Dr. Roger Clark)*
- 21 *Messier Marathon weekend*  
*(EGK Dark Site)*
- 26 *New Moon*
- 28 *EGK Dark Site Weekend*

**Come one, Come all !**

The DAS Spring Banquet will be held on Saturday, March 14th at Columbine Unitarian Universalist Church, 6724 S. Webster St. in Littleton. The church is located several blocks east of Wadsworth, on the south side of Coal Mine Road.

Romano's Italian Restaurant will, once again, be catering the Banquet, which runs from 6-9 pm. The cost, per person, is \$25.00. Checks and orders should be submitted to Wayne Green.

*Specifics and further info is available on the DAS website. See you there!*

*Observe*

*Image*

*Educate*

*Public Nights are held every Tuesday and Thursday evening at DU's Chamberlin Observatory at the following times:*

*March 9 to April 14 — 8:00 p.m.*

*April 15 to September 1 — 8:30 p.m.*

*September 2 to March 8 — 7:00 p.m.*

*The costs to non-members are: \$3.00-adults, \$2.00-children.*

*Please make reservations via our website [www.denverastro.org](http://www.denverastro.org) or call 303-871-5172*

**S&S  
OPTIKA**

*has moved to:*  
6579 S. Broadway  
Littleton, CO 80121

*~1 1/2 blocks NORTH of  
Arapahoe Road on the WEST  
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**(303) 789-1089**  
[www.sandsoptika.com](http://www.sandsoptika.com)*



The Denver Astronomical Society  
c/o Historic Chamberlin Observatory  
2930 East Warren Avenue  
Denver, Colorado 80120