



The Refractor

The Bulletin of the Eastbay Astronomical Society

Founded in 1924 at Chabot Observatory, Oakland, California

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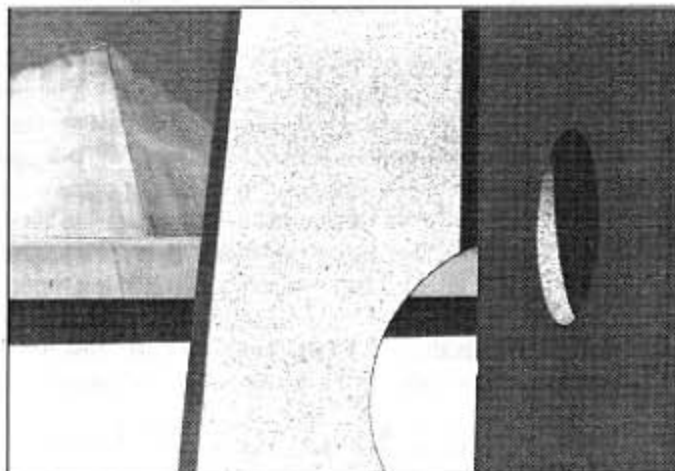
The Historical, Monumental, and Sometimes Quirky Sundials and Sun Sculptures of the San Francisco Bay Area

Chabot Observatory

4917 Mountain Boulevard, Oakland

Saturday, 7 November, 1998

7:31 pm - Public Program • 8:20 - Lecture



The granite Sunstones at the Lawrence Hall of Science on the University of California campus in Berkeley was designed by sculptor Richard O'Hanlon with astronomical calculations by Dr. David Cudaback. It marks not only equinoxes and solstices, but other loci such as the extremes of the orbit of Venus.

Photo: Ellis Myers

Carl Trost

EAS Member, World Traveler and Smiling Astronomer

- A 34-foot diameter dial used to promote the sale of a defunct racetrack subdivided into residential lots.
- A dial so large that an amphitheater is located inside its time ring.
- A 16-ton Sun sculpture on a front lawn that was moved across the bay because the home's new owners didn't like it.
- A make-over turns a spectacular, 50-foot floral dial into an ugly duckling.
- If you know where Wyatt Earp is buried, you won't have any trouble finding this nearby dial.

Continued on page 2

EAS, Chabot To Watch Leonids

It has been 32 years since the most spectacular meteor shower in recent times splashed the early-morning skies with more streaks of light than observers could count—more than one every two seconds! Might this Leonid meteor event be repeated this month? Perhaps.

But it is not at all probable. In fact, the chances for a prominent meteor swarm are better for a

location in Asia, because calculations suggest that, when the Earth meets the orbital path of Comet Tempel-Tuttle, China and Japan will be on the dark side and on the leading edge in Earth's orbit around the Sun. Even so, from local dark sky locations we may see something like one or two meteors per minute.

Eastbay Astronomical Society will join Chabot Observatory & Science Center to host a public meteor watch at Briones Regional Park from midnight until 6 AM on Tuesday morning, November 17. In case of cloudy or rainy weather, the session will be postponed until November 18, 1999.

To reach the sky party, take the Orinda exit from Highway 24 and proceed north on Camino Pablo/San Pablo Dam Road to Bear Creek Road. Turn right and go to the Briones Park entrance, on the right after four miles. The viewing area is to the left, shortly beyond the entrance gate, which will remain open throughout the night so that you may arrive late or leave early. You'll want to bring a blanket or lounge chairs, and perhaps be fortified with a thermos of hot chocolate. If you bring a flashlight, please have it covered with red plastic; and please dim your headlights in the immediate area.



This Leonid meteor near Orion was photographed from Henry Coe State Park on November 18, 1995. Photo courtesy of Mike Koop, California Meteor Society, and P. Jenniskens/NASA-ARC.

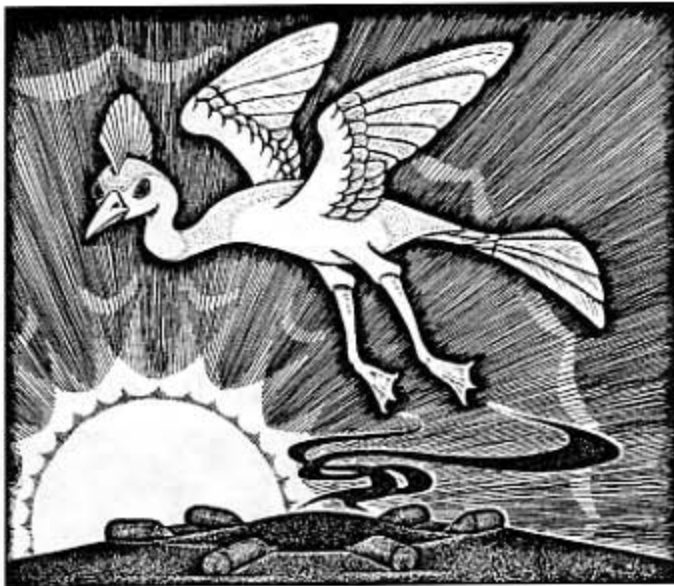
DINNER WITH THE SPEAKER

5:27 PM, Saturday, 7 November, 1998

PEARL OF SIAM RESTAURANT

5498 College Avenue, Oakland (510) 420-8600

Please call Betty Neall at 510 / 533-2394 by Friday, 6 November to confirm your place. Please note the time has been advanced to allow everyone to be able to get to the meeting promptly at 7:31 PM.



Phoenix, the Firebird

In 1603 the German astronomer, Johann Bayer of Augsburg, developed twelve new constellations in the southern celestial hemisphere, delineating them from observations and sketches made by the Dutch navigator Petrus Theodori. These twelve were added to the 48 ancient classical constellations and published in *Uranometria*, which in all listed 1709 stars. This landmark book also was the origin for the star-naming system we use today, using Greek letters together with the Latin genitive-case constellation name, e.g., Alpha Aquilae (Altair).

Among the twelve Bayer constellations is Phoenix, which he named for the mythical Firebird. The others were Apus, the bird of paradise; Grus, the crane; Pavo, the peacock; Tucana, the toucan; Columba, the dove; Dorado, the swordfish; Volans, the flying fish; Chameleon, the chameleon; Hydrus, the water snake; Indus, the Indian; and Triangulum Australe, the southern triangle. The most prominent southern constellation, Crux, although known to Bayer, was not recognized until the year 1679.

The mythical phoenix lives on aromatic herbs such as cinnamon, frankincense and myrrh. When it has lived for 500 years, it builds a nest of these materials on top of a palm tree. The bird then sets his own nest afire and dies among the vapors, but from its ashes a young Phoenix comes forth to live another 500 years. The Greek historian Herodotus, in the fifth century BC, described the bird: "I have not seen it myself, except in a picture. Part of his plumage is gold-colored, and part crimson; and he is for the most part very much like an eagle in outline and bulk." In Egyptian myth, the phoenix is revered as an embodiment of Ra, the Sun god. The phoenix is often a symbol of resurrection.

From the latitude of Oakland (38°) only a few of the stars of Phoenix will rise above the southern horizon during November and December evenings. The brightest star, Ankaa or Na'ir al Zaurak, is at declination -42°. It is a spectroscopic binary star with an 11-year period. West of this star by 6½ degrees is an unusual star SX Phoenicis. This is a pulsating subdwarf with just a quarter of the mass of the Sun, although it is two or three times as luminous. The star also has a large proper motion of 0.9 second per year, while it is at least 140 light years distant.

These are among the interesting, unusual pieces of astronomical art and pseudoart that one might encounter around town. Sundials come in many sizes and degrees of sophistication. Learn how accurate they can be; learn how frivolous they can be.

A member of the North America Sundial Society, Carl Trost has made a collection of these time pieces in the community, and the story is a fascinating one, told by a fascinating guy. Carl attended the University of California at Berkeley, where he spent most of his time in the Cal Band. In spite of this he squeaked through with an ordinary degree in electrical engineering. His one claim to fame is that he studied freshman physics under the late, great Luis Alvarez. His passions are white-water kayaking and photography. He is an accomplished astrophotographer though he doesn't use a telescope. Instead, he makes up Rube Goldberg-type, cheap long lenses to shoot the setting Sun from his home in San Francisco, for instance. As an astronomer, he admits to owning a copy of Olcott's *A Field Book of the Stars*, signed "Merry Christmas, 1937, from Aunt Minnie."

Carl's most ambitious trek to see and photograph a sundial was in 1995 when he went to India to tour the Jaipur observatory of Jai Singh. He reported on that trip and the reputed largest sundial in the world at the Eastbay Astronomical Society's July meeting in 1996.

In cooperation with COSC, the preliminary portions of EAS monthly meetings are now planned to be of general interest, with COSC members and the public invited. Before Carl Trost's program, EAS members Al Stern and Ellis Myers will talk about their recent observing experiences. Al will tell of using the 60-inch telescope at Mount Wilson, and Ellis will expand on his visit to the McDonald Observatory (see page 4). Following these presentations, a short business meeting will include a report of the nominating committee for EAS officers to be elected next month. Refreshments will be available, as Carl Trost has demanded chocolate-chip cookies as his speaker's honorarium.

COSC and EAS Dazzle CSUH

MoonDazzle, a yearly festival at Cal State Hayward, attracted hundreds of people who stood patiently in line throughout the evening of October 23 to view the Moon, Jupiter and Saturn and to hear EAS members explain the magic of the universe. Dave Rodrigues donned his Mr. Wizard costume and thrilled young and old alike with his spellbinding stories of the planets, stars and constellations. Tim Brockett, Allen Fisher, Mark Gingrich, and Bill Sheridan also offered invaluable help and merit thanks.

The featured guest of the evening was Dr. Sally Ride, first American woman in space, who gave a presentation entitled "Leadership and America's Future in Space." She was followed by José Olivarez, Chabot's Director of Astronomy, discussing "A Bountiful Harvest of Meteors," a topic particularly apt on the evening of the Orionid meteor showers and presaging the Leonids this month.

Under a big tent, Chabot Observatory staff members displayed a model of the new Science Center and young people from the Center's programs helped with hands-on activities for the children. The Cal State Jazz Ensemble played to make it a spectacular evening under the stars.

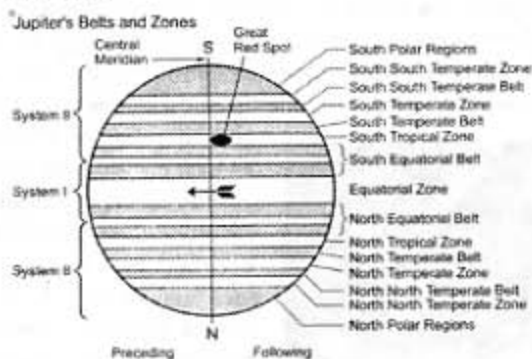
José's Observations



by José Olivarez

This is a brief report on the main features of interest on Jupiter so far this year. The Great Red Spot (GRS) is located in Jupiter's southern hemisphere near longitude 66 degrees by System II. You can find the timings of when the Red Spot will be near the center of Jupiter's disc in *Sky and Telescope* magazine. The Red Spot looks like a small pale-orange area tucked onto the southern side of a larger dark-rimmed ellipse known as the Red Spot Hollow.

Large turbulent-looking white spots follow the Red Spot area. This white spot activity in the South Equatorial belt just following the GRS is sometimes called "the wake of the Red Spot". There are six distinct belts now visible on Jupiter. From top to bottom (in a normal telescopic view) the belts are: The South South Temperate Belt (which is very broad); the South Temperate Belt (only a portion is visible, the rest is faint); the South Equatorial Belt (which is now undergoing a disturbance with many white spots in its middle); the North Equatorial Belt; the North Temperate Belt; and a fragmentary North North Temperate Belt.



The bright zones easily identifiable include the South Temperate Zone, the South Tropical Zone; the Equatorial Zone; and the North Tropical Zone.

There are about a dozen bluish festoons projecting into the Equatorial Zone from blue-spot sources on the south edge of the North Equatorial Belt.

Interestingly, while the NEB has bluish spots and festoons at its south edge, it has reddish spots on its north edge! These reddish spots are called "barges." An 8-inch telescope will show them as very dark and very reddish. These barges were especially prominent on Jupiter in 1997 and some of them are continuing to exist this year.

In summary: The Great Red Spot this year is more in its "Red Spot Hollow" aspect and is nearly stationary at longitude 66 degrees (II). There are six belts and four zones that can be readily seen. The North Equatorial Belt had bluish spots and festoons on its south edge and dark reddish spots (barges) on its north side!

These festoons and spots can be seen with an 8-inch aperture or larger. The North Equatorial Belt is the darkest belt on Jupiter and the North Tropical Zone is the brightest zone.

Comet Comments by Don Machholz

The evening sky reveals four telescopic comets, the latest being Periodic Comet Howell, which outburst recently and is now visible at magnitude ten. Periodic Comet Giacobini-Zinner is presently at its brightest. Meanwhile, Comet Williams swings behind the Sun and into our morning sky.

On September 13 Roy Tucker found a comet on a CCD image while conducting his asteroid project. It was the same object as (what was first believed to be) an asteroid picked up two weeks earlier by the Lowell Observatory Near-Earth Object Search. This comet, now named Comet LONEOS-Tucker, has an 8-year orbital period and is expected to remain fainter than magnitude fourteen.

Comet Hunting Notes: As seen from the Earth, how far are comets from the Sun when first discovered? This angle, called elongation, has been calculated for the 78 comets found visually by amateurs since 1975. It ranges from 22 to 171 degrees. More than half of the comets have been found within 58 degrees of the Sun. Seventy of the seventy-eight were found within 92 degrees of the Sun. Why are they found at such small elongations? Not only do comet hunters concentrate their searches on areas near the Sun, but comets generally become brightest in those regions.

Date (00UT)	R.A. (2000)	Dec.	Elong.	Sky	Mag.
21P/Giacobini-Zinner [Aquila-Capricornus]					
10-29	18h46.3m	-02°13'	69°	E	9.4
11-03	19h06.1m	-04°43'	68°	E	9.2
11-18	20h14.3m	-12°23'	68°	E	8.9
11-28	21h06.1m	-17°05'	69°	E	8.9
12-03	21h33.4m	-19°06'	70°	E	9.0
C/1997 J2 (Meunier-Dupouy) [Aquarius-Capricornus]					
10-29	20h59.0m	-11°30'	98°	E	12.5
11-03	21h00.1m	-12°29'	94°	E	12.6
11-18	21h05.7m	-14°54'	79°	E	12.9
11-28	21h11.0m	-16°08'	69°	E	13.1
12-03	21h14.0m	-16°40'	65°	E	13.2
C/1998 M5 (Linear) [Lyra]					
10-29	18h56.0m	+36°57'	83°	E	10.1
11-03	18h52.2m	+36°34'	80°	E	10.0
11-18	18h46.1m	+36°01'	72°	E	9.9
11-28	18h45.5m	+36°03'	70°	E	9.9
12-03	18h46.0m	+36°31'	66°	E	9.8
C/1998 P1 (Williams) [Hydra-Virgo]					
10-29	13h27.7m	-24°48'	16°	M	8.8
11-03	13h26.9m	-23°44'	18°	M	8.8
11-18	13h24.0m	-20°28'	30°	M	9.0
11-28	13h20.7m	-18°03'	41°	M	8.9
12-03	13h18.4m	-16°42'	47°	M	9.1
88P/Howell [Sagittarius-Capricornus]					
10-29	18h35.1m	-27°05'	63°	E	10.3
11-03	18h54.0m	-26°45'	62°	E	10.4
11-18	19h49.0m	-24°56'	59°	E	10.7
11-28	20h23.7m	-23°07'	57°	E	10.9
12-03	20h40.3m	-22°04'	56°	E	11.1

A Davis Mountain High *by Ellis Myers*

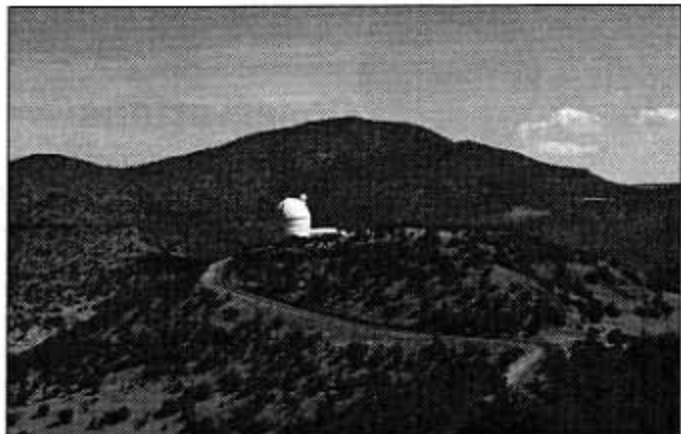
At the top of Mount Locke in Southwestern Texas, twenty privileged people gathered to spend the first week of October studying the sky. Four couples from Texas, two from Oklahoma, and one couple each from Alabama and California, as well as individuals from Arkansas, California, New Jersey, and Texas registered for the first Elderhostel course to be given at the McDonald Observatory of the University of Texas, near Fort Davis. All shared an interest in astronomy, but their experience and expertise ranged from novice to advanced amateur. Marshal Merriam and I represented the Eastbay Astronomical Society.

McDonald Observatory enjoys the darkest nighttime skies of any professional observatory in the country, as shown convincingly by satellite photos from space. Yet during the time of full Moon, astronomers are vexed, unable to do much useful observing. Once a month, then, the pace of scientific research slackens. The Davis Mountains Environmental Education Center took advantage of this situation to organize this program, under the aegis of Elderhostel, an international educational program provider for those over the age of 55. McDonald Observatory is also committed to education, and the partnership is most fortunate.

The unprecedented session proved to exceed everyone's expectations. On Sunday afternoon we checked in to the Transient Quarters, where visiting astronomers stay, and then were fed the first of the superb meals prepared by the staff. After an orientation and get-acquainted get-together, the evening ended early so that people would be ready for a survey of the morning constellations at five a.m.

Later that morning we were treated to a tour of the new Hobby-Eberly Telescope, which is still in its shakedown phase before fully engaging its scientific mission of spectroscopy. The HET is one of the truly great research telescopes. Its primary mirror, comprised of 91 hexagonal segments each one meter across, is the world's largest, and the telescope's innovative design will allow astronomers to search for black holes and for planets around distant stars. The HET will also be used by researchers to measure stellar distances and velocities and to study the chemical evolution of galaxies and nebulae. This Elderhostel group was the first nonprofes-

sional group to be shown the unique motions of the star-tracking system. The 27-ton instrument rotates on whisper-quiet air bearings over a perfectly flat concrete ring. Mounted at the top of the telescope a tracker collects light and conveys it through fiber optics to spectrographic instruments, which can be used to



The new Hobby-Eberly Telescope of the McDonald Observatory near Fort Davis, Texas, stands alone on Mt. Fowlkes, a mile away from its siblings on Mt. Locke.

determine the temperature, chemical composition and velocity of stars. The HET is operated by a consortium of five universities: The University of Texas and the Pennsylvania State University, with Stanford University and two German universities.

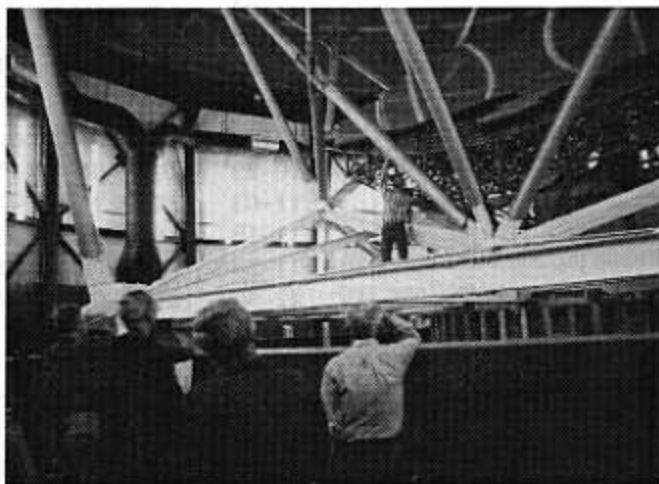
During the week, tours were also given of some of the other telescopes of the McDonald Observatory, including the historic Otto Struve 82-inch reflector and the 107-inch Harlan Smith telescope, both world-class facilities. The small Wren Supernova Search telescope is another one-of-a-kind design built for a specific purpose. Two supernovas have been discovered visually with this instrument, which employs a horizontally-mounted

18-inch reflector served by a 24-inch pivoting flat mirror.

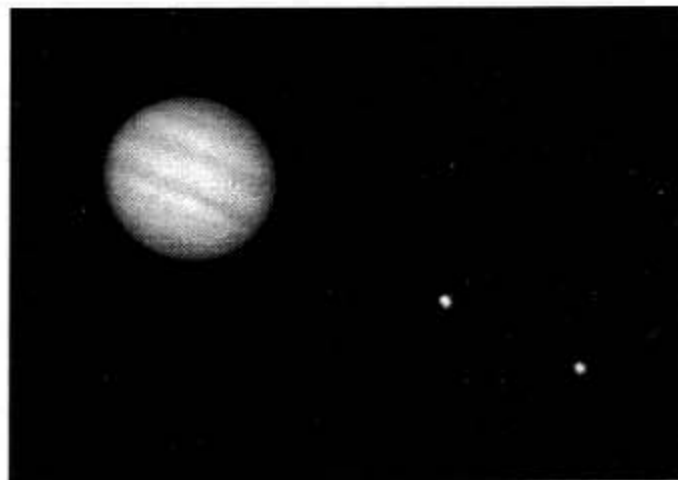
When daylight prevailed over the bright stars, the participants were kept busy with lectures on such subjects as light pollution control, amateur astronomy by computer, and the principles of spectroscopy. Our own star was imaged with the aid of a 16-inch telescope equipped with a hydrogen-alpha filter. Instructor Marc Wetzel had recorded views the previous day so that judgments could be made about the activity and growth of solar prominences.

When nighttime came, Elderhostelers plotted the pathways of Jupiter's moons or observed the galaxies and star clusters through a 36-inch telescope. One evening we joined the McDonald Observatory's

public star party, learning the constellations or teaching other guests. On the final evening of the course—the first anniversary of the dedication of the Hobby-Eberly Telescope, incidentally—an anticipated display of the Draconid meteor shower proved to be less than what had been hoped for.



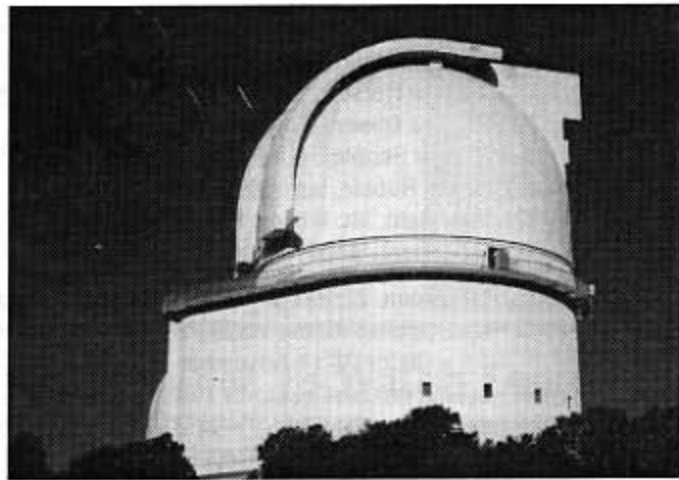
Standing below the primary mirror and within the structure of the HET, astronomer Matt Shetrone points out that the 91-segment mirror is fixed at a 35° angle. Between observations the entire telescope may be rotated on air bearings like a hovercraft. Note that several of the 1-meter mirror segments are not in place. The curvature of the spherical mirror can be noted by the arcs of reflections of the straight struts beyond.



Jupiter, Io and Europa were photographed by the author using the 36-inch telescope at McDonald Observatory on October 8, 1998. This photo is a composite of two exposures.

There was time for activities other than academic study, too, as host Wendy Forster led several field trips to neighboring points of interest, such as historic Fort Davis to learn about the legendary Buffalo Soldiers of the nineteenth century. And, of course, the famous (infamous?) Marfa lights had to receive a critical on-site examination. Certainly there are mysterious lights, but whether they are of natural origin or are perhaps automobile headlights has never been confirmed. It's claimed there are no roads in the vicinity of the lights, but it is reported that spectra show tungsten to be present.

At week's end all members of the group were exhilarated and pleased about their experience on the mountain. One of the



The Harlan Smith 107-inch telescope dome is seen illuminated by the full Moon. In a previous exposure the shot had to be abandoned when the operators rotated the dome.

most appreciated components of the week's stay was the opportunity to meet and talk to professional astronomers in residence. From a graduate student doing work for his professor, from McDonald Observatory staff scientists, and from a visiting astronomer from South Africa, Elderhostelers were able to gain an unmatched insight into the science of astronomy.

For those who may be interested in such a tour in the future, you may contact the Davis Mountains Environmental Education Center at P.O. Box 1138, Fort Davis, Texas 79734. Telephone: 800-403-3484. For other Elderhostel courses on astronomy, call 877-426-8056, write 75 Federal Street, Boston, MA 02110-1941 for a catalog, or check on-line at www.elderhostel.org.

Roberts Rules

By Carter Roberts

Elections for Eastbay Astronomical Society offices and for the Board of Directors will be held at the December meeting, following the report of the Nominating Committee at the November meeting. If you would like to serve as an officer for 1999, please contact Phil Crabbe, Conrad Jung or Bill Levinson well before November 7. You are encouraged to do so. Nominations will be closed after the November meeting.

Great weather favored the October 10 meeting in Joaquin Miller Park, when about 60 EAS members and friends attended the picnic and hard hat tour of the construction currently under way for the new COSC facility. There was good planetary viewing later on in the evening, as well. We want to thank Executive Director Mike Reynolds for inviting us to see the site, and for his fine culinary prowess, along with that of Mike Martinez. Many EAS members merit our thanks, too, for bringing telescopes and for generally helping make this an enjoyable evening.

Be alert for the Leonid meteors on November 17. If you can, come to the EAS/COSC meteor watch at Briones Park. There's a complete discussion of this phenomenon in the November issue of *Sky & Telescope*, including an item of interest if you wish to aim for photographs. You'll also want to attend the planetarium show about *The Leonid Meteor Storm* on Friday or Saturday, November 13 or 14, for a lecture by Director of Astronomy José Olivarez. The planetarium show *The Star of*

Bethlehem will begin on November 27 and continue on Friday and Saturday evenings through December 19.

As indicated in an earlier report, the November issue of *Sunset* magazine includes a paragraph about Chabot Observatory in its review of astronomical telescopes and planetariums that are available to the public in the western states.

The *Astronomical Calendar* published by Guy Ottewill is a reference work that is more than just a calendar. It's 75 pages of useful data you'll refer to often. For 1999, Don Stone will make a special purchase for EAS members, and if you want a copy, please contact Don right away at (510) 733-6738 to reserve one. Only advance orders will be taken, with only a minimum markup from the actual cost. Do not delay! Don will also be placing an order for a weekly desk calendar, *Astronomy in Space*, which would make a popular item for your Christmas giving. The cost for this calendar will be \$12.

Eastbay Astronomical Society

President:	Carter Roberts	(510) 524-2146
Vice President, Secretary:	Phil Crabbe II	(510) 655-4772
Treasurer, Membership:	Don Stone	(510) 733-6738

Articles and photos for *The Refractor* are encouraged. Deadline for the December issue is November 18, 1998. Items may be submitted by mail to the editor, Ellis Myers, 215 Calle La Mesa, Moraga, CA 94556. Internet e-mail address: cas@silicon.com. For further information please call (925) 284-4103.

Internet: <http://silicon.com/~eas> • <http://chabot.cosc.org/~eas>

DATELINE NOVEMBER

- 8 1656 Edmund Halley, born
15 1738 William Herschel, born
24 1883 Chabot Observatory opened, Oakland
2 1885 Harlow Shapley, born
20 1889 Edwin Hubble, born Marshfield, Missouri
2 1917 First light, Mt. Wilson 100-inch telescope
9 1934 Carl Sagan, born New York, New York
3 1998 Full Moon, 21:19 PST = 05:19 UT 4 November
10 1998 Last Quarter Moon, 16:29 PST
= 00:29 UT 11 November
17 1998 Leonid meteors peak, 11 PST = 19 UT
18 1998 New Moon, 20:27 PST = 04:27 UT 19 November
26 1998 First Quarter Moon, 16:23 PST
= 00:23 UT 27 November

Chabot Observatory Programs • November

Telescopes are open for viewing from 8:00 PM until 10:30 PM
on Friday and Saturday evenings.

For show reservations, phone (510) 530-3480 x36

- November 13 and 14 The Leonid Meteor Shower
The Sky Tonight in the Planetarium
November 27 and 28 The Star of Bethlehem
The Sky Tonight in the Planetarium

FUTURE CONJUNCTIONS

November

- 7 10:00 AM NCHALADA, Chabot
1. Ole Roemer 2. Horizon Markers
in Archaeoastronomy
7 7:31 PM EAS meeting, Carl Trost,
Sundials of the S.F. Bay Area
12 7:30 PM EAS Board meeting, Chabot
17 12:00 AM-06:00 AM Leonid Meteor Watch,
Briones Park

December

- 5 7:31 PM EAS lecture meeting
10 7:30 PM Eas Board meeting, Chabot

✓ Check our our Web Sites at:

<http://silcon.com/~eas>

<http://chabot.cosc.org/~eas>

If you have photos you would like to have displayed on our Web page,
please submit a .gif file, .jpg file or a color print to the editor, Ellis Myers.
Phone (925) 284-4103. We would be happy to include your work.

Eastbay

**Astronomical
Society**

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