



# The Refractor

*The Bulletin of the Eastbay Astronomical Society*

Founded in 1924 at Chabot Observatory, Oakland, California

Volume 76  
Number 9  
May 2000

## Show and Tell

Saturday, 13 May 2000

- General Meeting – 7:31 PM

### Chabot Observatory

4917 Mountain Boulevard, Oakland

## EAS Members

Our featured speakers for Members' Night will be Don Saito, Jim Scala, and Mark Gingrich. Don will be showing us three of his marvelous videos, each about ten minutes long. The first will be a Chabot Space and Science Center construction-site walk-through. If you haven't been to the construction site recently, be prepared to have your eyeballs blown away! The second shows the dome installation for Rachel, our 20-inch refractor which Don helped restore. The final video shows the installation of Rachel through the slit of the dome. (Photo in Carter Roberts' column.) Talk about a tight squeeze!

Another speaker will be Jim Scala. Jim will show us some of his wonderful astrophotography and tell us:

"About 25 years ago, Bell Laboratories developed the charged couple device (CCD) for information storage. However, its use as a sensitive optical detector has since revolutionized professional and amateur astronomy. Indeed, amateurs can routinely get to 18th magnitude, thanks to detectors that record about 50% of the focused light. What's more, the CCD efficiency has reached over 70% for professionals. Amateurs can produce images that were once the domain of large professional observatories, but their value to the amateur surpasses the spectacular pictures by a country mile.

"For the same reasons a CCD astronomer can cut through light pollution, he or she can also forget the toll aging extracts from our vision. Problems such as low vision, floaters and reduced dark adaptation no longer matter. A six-inch scope can capture spectacular images, search out nova, and take quantitative light curves of variable stars that change by less than a magnitude, detect asteroids and quantify their rotation. And there's much more.

"The image of M 51 is a good case in point. My gray hair attests to my low vision and I have plenty of floaters, and light pollution makes it difficult for me to see much more than a hazy



patch from my home observatory. However, with little effort I took two 20-minute images, combined them, sharpened the result, and adjusted the contrast. I would never have attempted that in a darkroom let alone be able to take a 20-minute image from my light-polluted back yard. No wonder some amateurs call themselves CCD Astronomers."

Also featured will be Mark Gingrich. Mark's topic is "Superior moments for viewing inferior planets." Mark has an unusually dry and sardonic wit, so be prepared to chuckle. Mark requests that all members in attendance that night have their overripe fruit and vegetables checked in at the door.



*Venus.*  
CCD image Jim Scala.

There may be other speakers, but none had signed up by the deadline posted in the April *Refractor*. Late-comers will be scheduled at the end of our program, time permitting. Come to our potpourri and expect to be surprised, informed, and amused!

There will be no Dinner with the Speaker this month.



## The Emperor and The Dragon of Spring

Chinese astronomers divided the heavens into four sections, with four great animals assigned to the four seasons. Giving their own character to each season were the Red Bird of summer, the Tiger of autumn, the Tortoise of winter, and the Dragon of spring. The stars of spring outlined the figure of a gigantic dragon. Writhing through Virgo, Sagittarius and Boötes, this beast carried a bright star to mark each of its two horns. The heliacal rising of these two dragon stars, Spica and Arcturus, foretold the advent of spring. The friendly dragon and the Full Moon of spring seen together meant the approach of new life, warmth, and the happiness of springtime—the New Year! And so Arcturus was given the honor of ruling heaven. This “Emperor” star was escorted by two Chinese asterisms, the “Officers,” faint star groups lying to the east and west of Arcturus.

The two celestial bears, Ursa Major and Ursa Minor, roam the northern circle of the sky, and from one culture to another there had to be someone to maintain order and to protect the sheep and cattle from the wild beasts. That was the role of the Herdsman, Boötes. His name has long been puzzling, for there are several possible sources for it in the Greek. It is likely that the name comes from βοητής, a word meaning to shout, for although the shepherd or herdsman is well armed, he is a protector of all creatures, and does not strike with his weapons if he can assert his authority by making a fearsome noise. This is certainly how the Arabs interpreted the name, for they made him Al Awwah, the Shouter, as we see in the illustration.

Arcturus is the brightest star north of the celestial equator, the fourth brightest star in the entire sky. In an otherwise rather empty part of the sky, this bright orange star can be observed in the daytime if first located with a telescope equipped with setting circles. This was first done in the year 1634.

Arcturus holds a special place in the thoughts of Hawaiians, for its declination of 19 degrees, 27 minutes matches the latitude of Hilo, Hawaii, and therefore it passes directly overhead as the Islands’ zenith star. (Of course, Arcturus can be

claimed as the zenith star also for Mexico City, Bombay, and San Juan, Puerto Rico. The zenith star for the Bay Area is Vega.)

In 1718 Edmond Halley found Arcturus to have a rapid proper motion across the sky of 2.28 arcseconds per year. Counting back, this means that in 1000bc Arcturus was located nearly two degrees northeast of where we see it today. The horns of the dragon are coming closer together!

In 1893 what became known as “The World’s Fair” was held in Chicago. Forty years later, in 1933, plans were made to open another fair in Chicago to celebrate the 100th anniversary of the founding of that city. Consequently, the theme of this second fair was “The Century of Progress.” It was suggested that light that had left Arcturus during the first World’s Fair would arrive in Chicago in time to set off the fireworks and start the festivities of the Century of Progress, after a journey of 40 light years through space. The light from Arcturus was focused on a photoelectric cell, amplified, and President Franklin Roosevelt threw the switch turning on the dazzling illumination for the Century of Progress. [But according to recently announced data from the Hipparcos satellite of the European Space Agency, Arcturus has been found to be only 36.7 light years away from Chicago, and the photons used to light up the fair started out about the time of the Spanish-American War.]

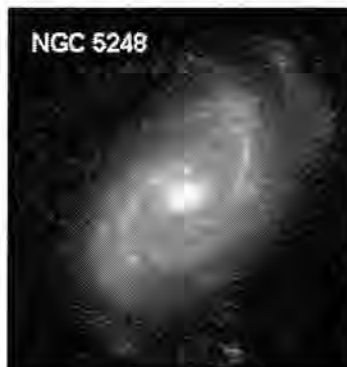
Amateur observers interested in variable stars have a new challenge, according to an article in the June, 1999, issue of *Sky & Telescope*, titled “Mining Hipparcos’s Buried Treasure.” The journal lists eleven stars—three of which are in Boötes—that are only now known to be variable because of the data returned by the Hipparcos mission. Author Roger Sinnott states:

[These stars] are quite suitable for study by amateur astronomers with small backyard telescopes or even large binoculars. Practically speaking, this type of research can’t be left to the professionals. That’s why variable-star work remains a field where dedicated amateurs can do some real science.

Boötes has several nice multiple stars. Zeta Boötis is a triple star with magnitudes of 4.5, 5.0 and 10.5. Epsilon Boötis is known as Izar, or Mirak, and is one of the finest colored doubles. It was discovered in 1829 by Frederick Struve. The magnitudes of the pair are 2.5 and 4.9 and their separation is 2.8 arcseconds. The color contrast is a yellowish orange primary with its dimmer blue-green companion. Xi Boötis is one of the closest binary star systems to us, at about 22 light years distance. Now separated by about 7 arcseconds, the two stars will close to less than 2 arcseconds over the next 50 years. The binary stars of

Iota Boötis are, on the other hand, growing farther apart from our angle of view. Watch these two systems over the next 100 years or so.

Deep Sky objects in Boötes include NGC 5248, a 10th-magnitude spiral galaxy. NGC 5466, a 9th-magnitude globular cluster requires a 10-inch telescope for best appreciation.





## Roberts Rules

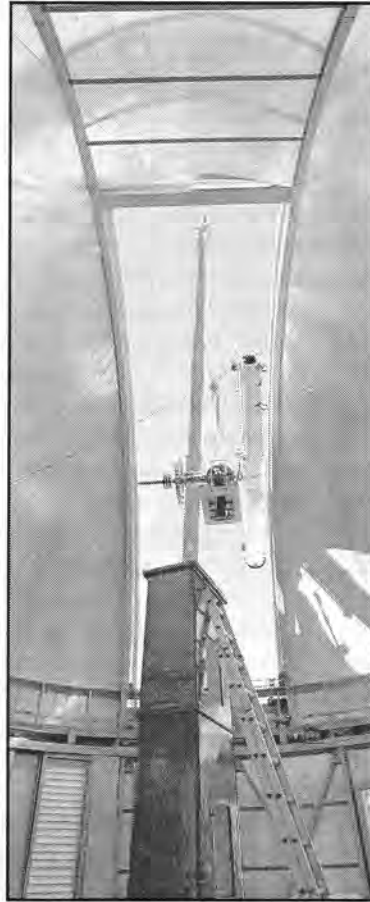
By Carter Roberts

After a number of delays due to weather, *Rachel* was moved to her new home on Saturday, March 18th. The skies were clear as the core members of the team assembled at Zeneca early in the morning to make the final preparations. A caravan of vehicles chased and photographed the truck with *Rachel* on the rapid trip to 10000 Skyline Blvd. The crane from Bigge was already in place and the workers from Observa-Dome were putting the finishing touches on *Rachel's* new home. Almost like clockwork the pieces were lifted in through the slit and set into position. Having worked on *Rachel* for so long, the team members knew exactly what went where as the jigsaw puzzle was reassembled. The only difficulty was reinstalling the counterweight shaft which screwed in with a fine thread. The largest piece fit through the 12-foot wide slit with a few inches to spare. Less than 5 hours after departure from Richmond, the last piece was bolted in place. There is still more work to do but most of that must wait for the floor to be finished.

*Leah* has been dismantled, and this historic instrument will undergo extensive restoration work in *Rachel's* old dome.

After years of planning and construction, the schedule for opening the Chabot Space & Science Center has been approved. After a series of pre-opening events, the public will be admitted beginning on Monday, July 31. The Grand Opening ceremony will be at 10:00AM on Thursday, August 3. The EAS Annual Dinner on Saturday, July 15th will give us a chance to preview this outstanding center and the best-in-the-world Zeiss planetarium projector. You will be impressed!

You would enjoy attending the Open House at the USGS Center in Menlo Park on May 13 and 14. This event occurs only every three years. Take advantage of this special opportunity.



## Reach Out and Touch the Stars

The world's highest and craziest star party will take place from Thursday, June 29 through Wednesday, July 5. It's the infamous White Mountains Star Party!

On Thursday night, June 29 we will stay at Grandview campground at a mere 8,700 feet to acclimatize to the altitude. At 12,400 feet in the rugged and beautiful White Mountains beyond the Sierra Nevada, this star party is an amazing experience! For up to five nights, we will stay at the University of California's Barcroft Laboratory, half Antarctic research station, half Shangri-La. For \$45 per person per night, bunk-style rooms and board are provided. The good food is provided by a chef and we dine in the highest dining room in the United States.

The White Mountains are the home of the beautiful bristlecone pines, the world's oldest living things. One of the delightful aspects of this trip is that it provides a wonderful opportunity to explore the spectacular scenery along highway 395. The region gives access to Mono Lake, the Owens River, Hot Springs, volcanic craters, Devils Post Pile, and Mammoth. And then there is Bodie, the notorious ghost town. A hundred forty years ago a little girl said in her prayers "Good bye God, I'm going to Bodie."

But the real reason you should plan to come with us is for the unparalleled views of the Milky Way from a point on Earth where there is little atmosphere between you and the stars.

For more information call Dave Rodrigues at (510) 483-9191 or send a check to 1633 Graff Ct., San Leandro, CA 94577-3938. Voice messages are preferred, but you may also send e-mail to [davevrod@aol.com](mailto:davevrod@aol.com).

### Welcome New EAS Members

Please welcome these new members of the  
Eastbay Astronomical Society.

Jon and Sally Brice III	Morgan Hill
Charles Dart	San Francisco
Lucy Fields and Jeff Gallup	Berkeley
Gert Gottschalk	Fremont
Larry Lazeretti	Richmond
Sam Skelly	Oakland

## Starry Nights in the Parks

**Pinnacles National Monument** will present a series of starry night astronomy programs this Spring. Pinnacles National Monument is fortunate to have relatively pristine night skies away from city lights, and offers great views of the stars and planets. The first program will be Friday evening, May 5th. A short talk by park scientist Chad Moore will begin at 8:30 PM, followed by telescope viewing. Visitors are welcome to stargaze throughout the night. The Eta-Aquarid meteor shower may appear in the pre-dawn hours. Autos should arrive at the east entrance via Hwy 25, as there is no access from the west side. Nights at Pinnacles can be cold, so dress very warm. Overcast weather at the park cancels; please call ahead for last minute information. Additional starry night programs will take place on Friday, June 2nd, and again later in the year. Amateur astronomers with their own telescopes are welcome to attend.

Pinnacles National Monument was established in 1908 and features tall rock spires, unique geology of an ancient volcano, miles of hiking trails, rugged wilderness, abundant wildlife, and native chaparral vegetation. In addition to the Starry Night programs, Pinnacles sponsors a variety of nature hikes, wildflower walks, evening bat talks, and full-Moon hikes. Visitors are reminded that Pinnacles National Monument is a fee collection site as a day use park. For further information call the park at (831) 389-4485 or consult the website at [www.nps.gov/pinn](http://www.nps.gov/pinn).

**Sugarloaf Ridge State Park** is the location of the Robert Ferguson Observatory of the Valley of the Moon Observatory Association near Glen Ellen. The Observatory will host the public for stargazing on May 13, June 10 and 23, as well as each Saturday in July. Available telescopes include the member-built Moore 40-inch and the recently installed Fruth 14.5-inch CCD telescope. This instrument is coupled with a 6-inch f/5 wide-field refractor which allows visitors to view directly celestial objects which are being displayed on the computer monitor. State Park entrance and parking fee is waived for these public viewing nights. Call (707) 833-6979 for the latest updates, or check at [www.rfo.org](http://www.rfo.org).

Mount Diablo Astronomical Society will host public star parties atop **Mount Diablo State Park** on May 13 and June 10. MDAS has a Public Program Hot Line at (925) 691-6362 and a Web address of <http://members.aol.com/mdas101b/private/index.htm>.

**Mount Tamalpais State Park** presents astronomy lectures throughout the summer in the Mountain Theater, followed by telescope viewing in the Rock Springs parking area. On Saturday, June 3, Maria Mitchell is portrayed by Tinka Ross relating "A Cometary Rise to Fame." July 1 finds Dr. Dana Backman, of Franklin & Marshall College, speaking about planets around nearby stars. For information, go to [www.mtia.net](http://www.mtia.net), or phone (415) 455-5370.

At **Fremont Peak State Park**, the 30-inch Challenger telescope is open for public viewing on Saturday evenings from May 27 through July and past, with the exception of full-Moon weekends of June 17 and July 15. Sessions begin with slide presentations at 8 PM, given by the Fremont Peak Observatory Association. Their Web site is [www.astronomy-mall.com/fpoa/](http://www.astronomy-mall.com/fpoa/).

## Comet Comments *By Don Machholz*

More comets have been found by the SOHO satellite, while LINEAR has discovered a faint, small comet. No bright comets are in our sky again this month.

This is a slow time of the year, comet-wise. The comet that is expected to be the brightest of the year—Comet LINEAR (C/1999 S4)—is new to the solar system. This means it burned off tons of volatile material while far from the Sun, giving the impression that it is a bright comet. It may brighten to only magnitude 5 or 6. Remember Comet Kohoutek! We have a couple more comets that should be visible late in the year. Comet McNaught-Hartley (1999 T1) may approach magnitude 6 late this year, but it will be far south and within 70 degrees of the Sun until then. Periodic Comet Encke will be briefly visible to each Hemisphere late in the year.

SOHO images revealed ten more comets in the past month. Five of them were from images taken in 1999. Nine are from the Kreutz family of sungrazers. Various people found these comets, among them are: M. Oates, D. Biesecker, A. Vourlidas, M. Meyer, T. Lovejoy, J. Shanklin, and K. Cernis.

The LINEAR program recently found a comet that may be of short period. Comet LINEAR (C/2000 G1) is presently only 30 million miles from us but at a faint magnitude 17. That's a small, faint comet!

Comet Hunting Notes: How many comets are discovered visually by amateurs each year? In the past 25 years there have been 81 visual discoveries, or 3.24 per year. From 1975 through 1984 there were 33 finds, with 34 comets from 1985 through 1994. The rate slowed a bit during the five years 1995–1999, with 14 finds, or 2.8 per year. It will be interesting to see how this will change in coming years with competition from the automated programs.

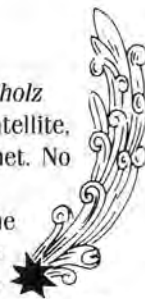
This is my last issue of Comet Comments. After twenty-one years of writing this column I am now at the point where it is often difficult for me to write an intelligent, interesting and timely article each month. At the same time there seems to be less need for this type of comet news on a monthly basis. The Internet can substitute for the things I write, and more rapidly too. I want to thank you for being an attentive audience.

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At **Yosemite National Park**, there are three star parties this summer that are of interest. San José Astronomical Association conducts two public observation programs at Glacier Point on July 21 and 22. Should you be in Yosemite on vacation at that time, plan to attend these free events, but—even better—sign up with SJAA and your entrance to the Park will also be free. SJAA maintains a Hotline at (408) 559-1221 and a Web site at [www.seds.org/billa/sjaa/sjaa.html](http://www.seds.org/billa/sjaa/sjaa.html).

Also at Glacier Point, Tri-Valley Stargazers will hold their annual Yosemite Star Party on September 1-3. The Tri-Valley Web site is [www.trivalleystargazers.org](http://www.trivalleystargazers.org); Phil Waide can be reached for information at [waide1@lnl.gov](mailto:waide1@lnl.gov).

And don't forget our own Star Party that we present in cooperation with the East Bay Regional Park District at Bort Meadow in **Chabot Regional Park**, this year on Friday evening, August 4. Save the date: we need your participation.







chabot  
space & science center

## Come Join the Volunteers

By Marcia Hale, Volunteer Services Manager

Wondering what else there will be to do as a volunteer at new Chabot, besides the telescopes? Find out at a very special Volunteer Sampler for new Chabot, Monday, May 15, 6:30–8:00PM. Staff members from each area needing volunteers will have displays, examples and information on the activities and volunteer opportunities available.

The event will be held at old Chabot since construction is still continuing at the new site.

This is a great opportunity to learn about the upcoming educational programs and other opportunities for volunteers. Volunteers donate at least two four-hour shifts monthly. If you know friends or neighbors who'd like to volunteer, encourage them to attend this special event. Volunteers must be in 7th grade and at least 13.

Volunteer training is held monthly. New volunteers can expect to begin volunteering by mid-July.

## Library Concerns

in the new Chabot Space & Science Center will be discussed before the EAS meeting on May 13 at 6PM. We need to have your input—otherwise we may no longer have access to the Burns Memorial Library! We are nearly ready to begin moving into our new quarters about June 1, when the new space is finished and shelving installed. Please join us in making decisions concerning relocation plans and policies.

By Anne Creese

## Universe 2000

is a composite of events complementing the 112th Annual Meeting of the Astronomical Society of the Pacific. Included are a scientific symposium, workshops on teaching astronomy in grades 3–12 and also for college non-science majors. The Expo will feature panel discussions with leading astronomers covering astronomy in history, art, science fiction and the media. Accompanying social opportunities include tours of Mount Wilson Observatory and Griffith Observatory and an Awards Dinner. The Astrobiology Symposium is titled "From Dust to Life: Surviving the First Billion Years of the Solar System."

Universe 2000 will be held at the Pasadena Convention Center from July 13–19. Anyone is welcome to register for any workshop, symposium, or event, although prices are lower for ASP members, and discounts are further applied when registrations are received by May 19. To join ASP, or for more information about this astronomy exhibition, call (415) 337-1100 or go to [www.aspsky.org](http://www.aspsky.org).

**NCHALADA** • Saturday, May 20, 2000 • Chabot

Morning Session: Longitude

Chair: Bruce Mehlman

Afternoon Session: The History of the History of the Universe

Chair: Nancy Cox



## Points of Light

[The Refractor welcomes items about EAS members in the news, their published articles, their conference presentations, or word of their completed astronomical projects.]

To view the solar disk at various specific wavelengths requires a rather specialized gadget known as a spectrohelioscope. And **Fredrick N. Veio**, a long-time champion of amateur-constructed versions of this instrument, has recently revised his booklet titled *The Spectrohelioscope*, which contains design plans and discusses observing techniques. A synopsis of this booklet appeared in the "Books & Beyond" section of the May 2000 issue of *Sky & Telescope*.

In that same issue of *S&T*, an observation of the double star 78 Ursae Majoris by **Jim Scala** was cited in Sissy Haas's article "Double Stars off Mizar."

The Astronomical Association of Northern California last month presented the AANC Special Award for outstanding and continuous support in distinguishing and fostering Amateur Astronomy to the core members of the team renovating Chabot Observatory's 20-inch refractor. **Denni Medlock, Kevin Medlock, Carter Roberts, Don Saito, and Ken Swagerty** received well-deserved kudos for their many hours of labor and for meticulous workmanship.

The telescopes of Chabot Observatory aren't the only large astronomical artifacts to be relocated within the Oakland city limits of late. A 73-year-old sculptural sundial in the form of a Greek youth wielding an hour-line-scribed shield and a shadow-casting spear for many years resided at the Oakland Museum. However, in March it was trucked to the courtyard garden of the Children's Hospital of Oakland Research Institute—no small task since the sculpture is inextricably anchored to a boulder weighing more than 1000 pounds! **Carl Trost** volunteered to insure the celestial fidelity of the sundial's orientation. This was achieved successfully; the sundial now reports time-of-day with much improved accuracy when compared to its previous setting.

In the "Star Trails" column in the April issue of *Sky & Telescope*, David Levy writes, concerning meteors:

"With fellow amateur astronomers Bob and Jean Citkovik and **Alan Stern** and his daughter, **Michelle**, we observed the 1999 Leonids from a cruise ship sailing near Samos, the island in the Aegean Sea where Pythagoras was born and the home of Aristarchus, who postulated a Sun-centered universe more than 2,000 years ago. If the island's sky was clear for Aristarchus, it certainly wasn't for us. The night of November 17th began with clouds and, other than a few periods of clearing, it stayed that way throughout. We did catch glimpses of several fireballs through holes in the cloud cover.

"One of those holes was fortuitous, however. At around 4:10AM local time, as the Leonids were coming down thick and fast over the Mediterranean, the clouds broke in one small window that revealed the stars of Auriga. We saw five bright meteors race through that small piece of clear sky in a single minute! So despite the less-than-ideal conditions, we can say that we did indeed see the Leonid storm of 1999."



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## DATELINE MAY

- 5 1961 Freedom 7 (Mercury), Alan Shepard  
First American in space (suborbital)
- 30 1966 Surveyor 1, first American soft Moon landing
- 30 1971 Mariner 9 launched, first Mars orbiter
- 14 1973 Skylab, first American space station
  
- 3 2000 New Moon, 21:13 PDT = 4:13 UT 4 May
- 10 2000 First Quarter Moon, 13:001 PDT = 20:01 UT
- 18 2000 Full Moon, 00:34 PDT = 07:34 UT
- 26 2000 Last Quarter Moon, 04:56 PDT = 11:56 UT

### Eastbay Astronomical Society

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Treasurer, Membership: Don Stone (510) 336-3680  
ddcstone@earthlink.net

Articles and photos for *The Refractor* are encouraged. Deadline for the June issue is May 19, 2000. Items may be submitted by mail to the editor, Ellis Myers, 215 Calle La Mesa, Moraga, CA 94556. Internet e-mail address: eas@silcon.com. For further information please call (925) 284-4103.

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

## FUTURE CONJUNCTIONS

### May

- 13 7:31PM EAS Members Meeting
- 13-14 USGS Open House, Menlo Park
- 18 7:30 PM EAS Board meeting
- 20 NCHALADA, Chabot
- 26-29 RTMC, Camp Oakes at Big Bear

### June

- 10 7:31PM EAS Lecture Meeting
- 15 7:30 PM EAS Board meeting

### July

- 13-19 Universe 2000, ASP, Pasadena
- 15 6:00 PM EAS Annual Dinner Meeting
- 20 7:30 PM EAS Board meeting

### August

- 4 EAS Star Party at Bort Meadow
- 12 7:31 PM EAS Lecture Meeting
- 17 7:30 PM EAS Board meeting
- 18-20 North American Sundial Society