



# The Refractor

The Bulletin of the Eastbay Astronomical Society

Founded in 1924 at Chabot Observatory, Oakland, California

Volume 75  
Number 9  
May 1999

## Take a Nebula, Condense and Stir

### Norm Sperling

Sonoma State University  
and Merritt College

Saturday, 1 May, 1999

- 7:31 pm – General Meeting
- 8:20 pm – Lecture

### Chabot Observatory

4917 Mountain Boulevard, Oakland

Astronomers discovered planets, stars, asteroids, comets, meteorites and moons at different times, and labeled them according to different criteria. For example comets "look hairy;" asteroids "look star-like;" meteorites "fell through the air and landed;" planets "move around the Sun;" moons "move around planets." None of these describes the objects' physical nature.

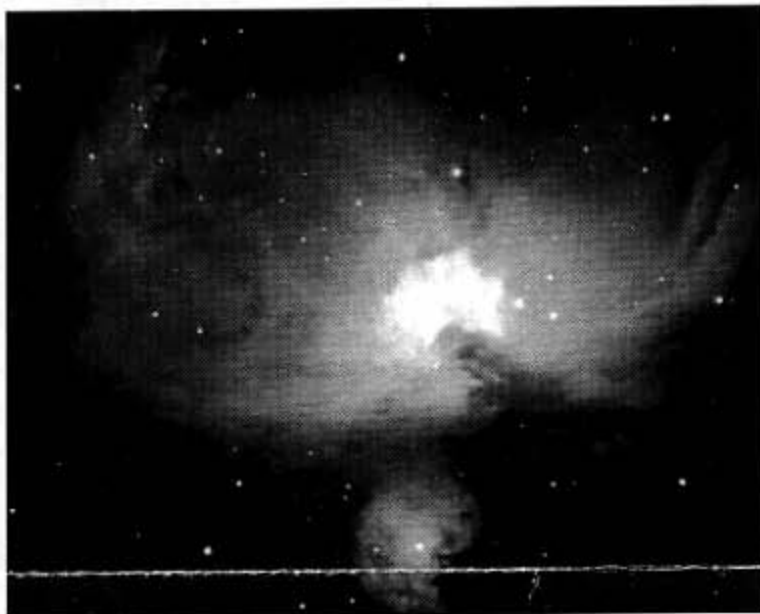
The last 30 years of space exploration and computer modeling teach us better. Those are not really separate categories. They blend into one another. They all originate from a Nebula. The recipe for all of them is the same: "Take a Nebula, Condense and Stir." What distinguishes them are the processes they undergo. Most of their differences come from their mass, and how hot they got inside.

Norm Sperling has charted these characteristics, and is preparing to publish the result as a poster, with artwork by famous space artist Don Davis. The poster shows how the pieces of the puzzle fit together, and how each kind of object became the way it is now.

Norm will include in his discussion the question "Is Pluto still a planet?" If it had been discovered seven years ago, rather than seven decades ago, how would we have classified it?

Norm Sperling teaches astronomy at Merritt College and Sonoma State University, and lectures at Morrison Planetarium. He has been an editor of *Sky & Telescope* and a planetarium director. His company, Everything in the Universe, published books by John Dobson (*How and Why to Make a User-Friendly Sidewalk Telescope*) and David Levy (*The Universe for Children*). His new website, [www.EverythingInTheUniv.com](http://www.EverythingInTheUniv.com), includes books and posters, and other new products.

Sperling received the Western Amateur Astronomers' 1992 National Service Award from the Astronomical Association of



*This emission and reflection nebula, in the constellation of Orion, is the center "star" of the three in the fairly bright Sword of Orion. It is one of the grandest sights in the winter night sky—easily visible in binoculars.*

*Composed mostly of a hydrogen gas cloud in our Galaxy, the Milky Way, M42 is a "stellar nursery," where stars like our Sun are currently being born.*

*Photo by EAS member Robert S. Hoyle, from Fremont Peak.*

Northern California in 1989, and was named a Fellow of the International Planetarium Society in 1986. He is active in many organizations. He is vice chair of the Bay Area Skeptics, and he is host and co-founder of the Northern California Historical Astronomy Luncheon and Discussion Association (NCHALADA).

Join Norm and his wife, Yanping, for dinner at Little Shin Shin Restaurant, 4258 Piedmont Avenue, Oakland, near Fenton's Creamery.

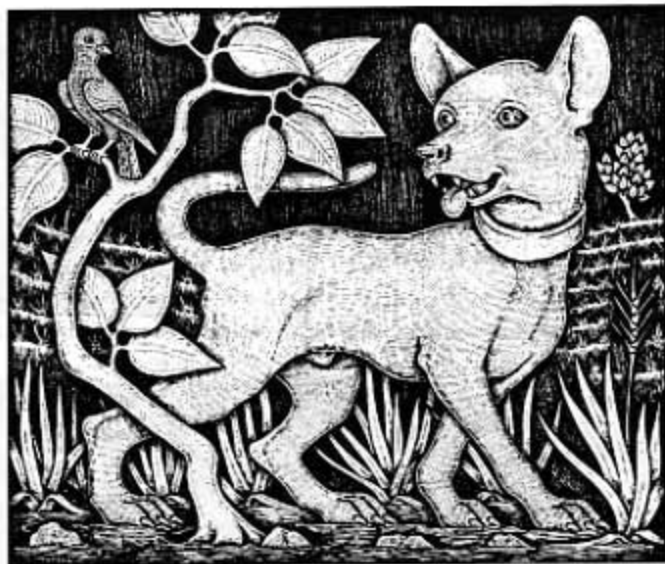
### DINNER WITH THE SPEAKER

5:27 PM, Saturday, 1 May, 1999

### LITTLE SHIN SHIN

4258 Piedmont Avenue, Oakland (510) 658-9799

Please call Betty Neall at 510 / 533-2394 by Friday, 30 April 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.



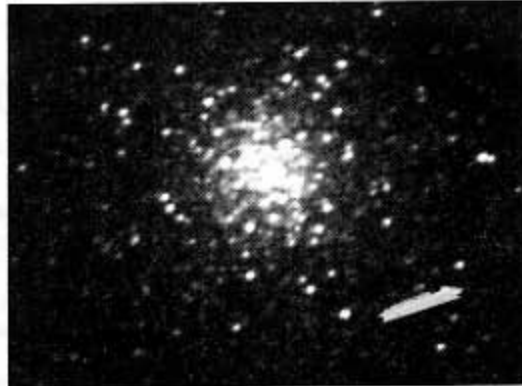
## Canes Venatici

was delineated by Johannes Hevelius to represent Asterion and Chara, the two dogs of Boötes as he hunted the northern skies for the bears, Ursa Major and Ursa Minor. You can find these hounds by looking to the right of Boötes and south of the tail of the Great Bear. But you will have to look closely, for the brightest star of the 23 that Hevelius described is but magnitude 2.9. This is Cor Caroli—a fine double star. If, on a mid-May evening at about 9:30 or ten o'clock, you were to drop a plumb bob from Cor Caroli, it would come to Earth somewhere in the vicinity of Sonoma or Napa. It was Edmond Halley who named Cor Caroli in honor of King Charles II of England.

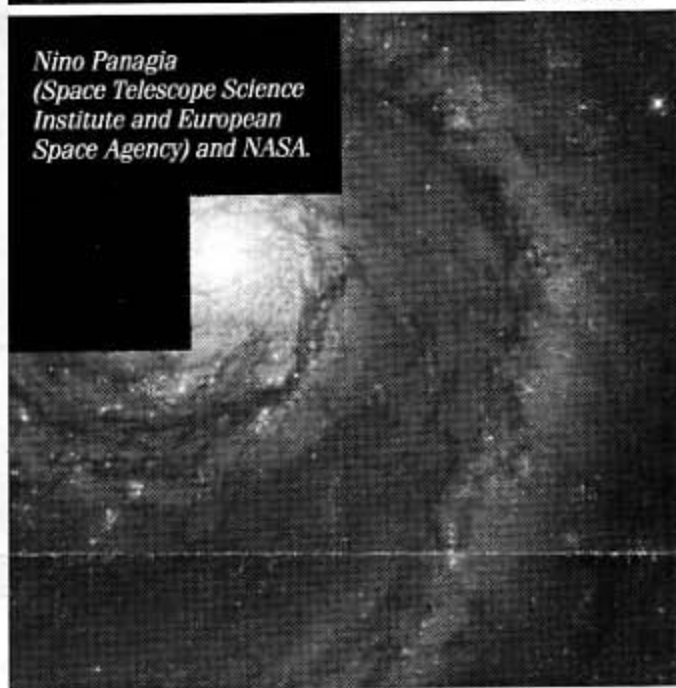
There are only two other stars bright enough to merit names of their own. Chara is  $\beta$ -Canum Venaticorum; and there is a star of magnitude 5.5 that has been called La Superba, a peculiar type of star with "superbly flashing brilliancy of its prismatic rays." It is a brilliant red star whose light varies over a period of half a year between magnitude 5.2 and 6.6.

But what the Hunting Dogs lack in bright stars, they make up for with a wealth of galaxies. Five Messier objects are among the hundred deep-sky objects that may be found with even a small telescope. M51 is the Whirlpool Galaxy (NGC 5194), one of two connected galaxies—a pretty face-on spiral galaxy joined at the end of one of its spiral arms to the irregular galaxy NGC 5195. A 10- or 12-inch telescope and a dark sky are needed to discern the spiral arms, while smaller telescopes or large binoculars should reveal two fuzzy dots. The spiral nature of this galaxy was the first such to be discovered. In 1845, Lord William Parsons, the Irish Earl of Rosse, made the observation with his reflecting telescope that had a mirror diameter of six feet. As was William Herschel, Lord Rosse was a British amateur astronomer; but unlike Herschel, he was a wealthy landowner with the means to devote his time and money to his interests. The instruments that Lord Rosse designed and built were enormous machines supported by derricks and chains.

M63, M94 and M106 are also spiral galaxies; and M3 is a bright globular cluster of stars 200 light years across and 35,000 light years distant. It is located almost on a straight line and a little over half way between Cor Caroli and Arcturus.



The large globular cluster M3 (NGC 5272), shows as a pretty ball of sparkling points in this CCD photo by Conrad Jung, taken with his 6-inch Maksutov.



Nino Panagia (Space Telescope Science Institute and European Space Agency) and NASA.

The Hubble Space Telescope has snapped a view of several star generations in the central region of the Whirlpool Galaxy (M51), a spiral region 23 million light-years from Earth in the constellation Canes Venatici. The galaxy's massive center, the bright ball of light in the center of the photograph, is about 80 light-years across and has a brightness of about 100 million Suns. Astronomers estimate that it is about 400 million years old and has a mass 40 million times that of our Sun. The concentration of stars is about 5,000 times higher than in our solar neighborhood, the Milky Way. The dark Y across the center is a sign of dust absorption. The bright dot in the middle of the Y has a brightness of about one million suns, but a size of less than five light-years. Its power and its tiny size suggest that we have located the elusive central black hole that produces powerful radio jets. Surrounding the center is a much older stellar population that covers a region of about 1,500 light-years in diameter and is at least 8 billion years old, possibly as old as the Universe itself, about 13 billion years. Further away, there is a "necklace" of very young star-forming regions, clusters of infant stars, younger than 10 million years, which are about 700 light-years away from the center. Normally, young stars are found thousands of light-years away. Astronomers believe that stars in the central region were formed when a dwarf companion galaxy—which is not in the photograph—passed close to it, about 400 million years ago, stirring up dust and material for new star birth.



## José's Observations

by José Olivarez

### Johannes Hevelius and His Personal Stars

Johannes Hevelius (1611-1687) of Danzig (now Gdansk) is probably the only astronomer that was able to add seven new constellations to the sky and have them retained to this day in spite of the fact that three of them were of a personal nature. Four of these figures are now in our Spring sky. Two are near the Big Dipper (Canes Venatici and Lynx) and two are near Leo (Leo Minor and Sextans). All of these constellations are faint with fourth magnitude stars defining the figures. So, these constellations are a challenge to see from the light-polluted skies of the Bay Area cities where the limiting naked-eye magnitude is about 3.5 at best. If you attempt to see Hevelius's constellations, go out to darker skies where the limiting magnitude is at least at the 5th magnitude level.

The three constellations that Hevelius invented that were of a very personal nature and have nevertheless survived in the sky to this day are Lynx, Sextans, and Scutum. Lynx and Sextans are in the evening sky in the Spring and Scutum (the home of M11) is a Summer figure. Hevelius put Lynx in the sky as an expression of his pride in his good eyesight—his eyes of a Lynx. Indeed, Hevelius was so proud of his excellent eyesight that he refused to add a telescopic sight to the sextant he used to determine star positions! Today, ironically, Hevelius's Lynx requires us all to have the "eyes of a lynx" to find its faint and far-strewn stars!

Sextans reflects Hevelius's pride in one of his astronomical instruments—the celebrated large sextant with which he had produced his catalogue of more than 1,500 accurate star positions that were published in the *Prodromus Astronomiae* in 1690 as the *Catalogues Stellarum Fixarum*. This sextant was also the first scientific object to be placed in the sky. Also, Sextans is placed between Leo and Hydra for a very good reason. Hevelius placed his sextant there because those two animals were said to be of a fiery nature and formed a sort of commemoration of the destruction of the instrument in the fire that consumed his observatory in September of 1679.

Scutum is short for Scutum Sobiescianum (Sobieski's Shield) and is pictured as the coat of arms of Jan Sobieski III, King of Poland. Sobieski was Hevelius's friend and loyal patron who financed most of his wonderful publications. In appreciation for his unflagging support, Hevelius named his beautiful star atlas *Firmamentum Sobiescianum* and tucked his shield in the Milky Way next to Aquila where it still sits today.

Two other Hevelius constellations that still survive today but that I have not yet mentioned are Lacerta (the lizard) and Vulpecula (the little fox). They are both small figures tucked near Cygnus, the swan.

Why do constellation figures that express Hevelius's appreciation of his patron, his pride in his sextant, and his pride in his eyesight still grace our skies today when similar attempts by other celestial cartographers were met with almost immediate ejection from the sky? It may be because Hevelius's figures fill empty-looking areas of the sky. But it is more likely still that it is Johannes Hevelius's great name that has kept them up there!

## The White Mountains Trip

The annual low-oxygen star party at the Barcroft Lab in the White Mountains east of Bishop will be held the weekend of July 10. This is a joint event primarily with members of the Tri-Valley Stargazers and the EAS. From the Grandview campground at 8600' on Thursday evening we go up to Barcroft, above treeline (the highest trees are bristlecone pines) at 12400' on Friday for three nights. Dave Rodrigues is in charge. It is a real bargain at only \$40 for each night at Barcroft for room and board and all the oxygen you need! Contact Dave at [DaveVRod@aol.com](mailto:DaveVRod@aol.com) or (510) 483-9191 with questions, or send him your check at 1633 Graff Ct., San Leandro, CA 94577.

For an example of what you can see from the dark sky of Barcroft, look on our web site at <http://chabot.cosc.org/~eas/catspaw.htm> for one of Axel Mellinger's fine astrophotographs from the 1997 trip.

## This Is a Note of Thanks

to all the EAS members who have donated books and journals to the Burns Library. It is also a note of thanks to Anne Creese, our librarian, who maintains the collection and hosts members after each regular meeting.

Recent gifts have been received from Phil Crabbe and from Conrad Jung. Phil's gift included ten new astronomy books, and Conrad brought in some well-needed back issues of magazines, destined to be bound and placed on our shelves. These materials will be of value when moved to the new facility. Until then, although library space is particularly crowded, you may come in and browse, or check out books for research.

## Astronomers' Stars

is one of the books just donated to the Burns Library by EAS Vice-president Phil Crabbe. By the eminent and popular English writer Patrick Moore, this is an astronomy book that comes with a different viewpoint. Moore has been an enthusiastic astronomer since childhood and has his own private observatory. He was president of the British Astronomical Association and is a Fellow of the Royal Astronomical Society. Among his many books are *Exploring the Night Sky with Binoculars*, *The Sky at Night*, and *Armchair Astronomy*.

In essence, this book follows the history of astronomy by introducing specific stars and explaining why they are unique and how their specific character led to the advancement of knowledge. Moore begins with a study of 61 Cygni and the concept of parallax. Mizar allows the author to explain the 1889 Edward Pickering discovery of spectroscopic binaries. Next comes Betelgeuse and a discussion of the HR diagram and of the colors and temperatures of stars. Other chapters are devoted to Sirius, Vega, Algol, Epsilon Aurigae, Mira, Delta Cephei, Eta Carinae and a half-dozen others, each taking a place in the story of stellar astronomy. The author's stated goal of making the book intelligible to all those who read it regardless of age or prior knowledge is nicely achieved. Simple, effective diagrams enrich the reader's understanding from this book, which sprinkles in a number of anecdotes you've likely not heard before.

While not truly up-to-date, *Astronomers' Stars* is well worth several evenings of leisure reading.

## Riverside Telescope Makers

The Riverside Telescope Makers Conference ([www.rtmc-inc.org](http://www.rtmc-inc.org)) will be held over the Memorial Day weekend near Big Bear Lake in the San Bernardino Mountains. The gates open at 9 AM on Friday and vendor sales begin at noon. There are always good bargains there and also at the swap meet that starts about dawn on Saturday where you might find that telescope part you have been looking for. RTMC is far more than a gathering of telescope makers. Since there will be a full Moon that weekend, there will be a number of interesting presentations about the Moon and lunar observing organized by our own John Westfall. Come meet over 1000 fellow amateur astronomers.

## For Young Astronomers and Astronauts

Now is the time to plan ahead for summer activities that will enlighten, enrich and entertain your children or grandchildren. The Summer 1999 Children's Classes at Chabot Observatory and Science Center may be just what your favorite child will enjoy (and get him or her out of the house for a while).

Jennifer Lipyanik will lead courses called "Astronomy for Kids" for kids in grades 2-4 from June 29 to July 1; and for grades 5 and 6 from July 12 to July 14. Our staff planetarium instructor, Jennifer will engage the youngsters with all kinds of hands-on experiments in the laboratory and in the planetarium. Enrollment is limited, and the courses cost \$75 (an additional \$5 will cover the cost for the older kids for materials to make a telescope that they will take home).

Melissa Salazar and Craigton Tong are in charge of a Space Camp, June 21-25, and Tech Camp, August 23-27, for those in grades 6-8. Spend five days in "astronaut training" and work with rockets and robots. Each camp is restricted to 16 participants, and the cost is \$200.

A course for girls only—grades 6-9—is titled "The Obedient Robot." From August 2-6, Head Royce teacher Holly Below will engross the girls in the fun of Lego-logic. The girls will build creatures and machines, hook them up to a computer, and teach them to move on command. Lights, music and action come forth when the sensors and electronics obey the young scientists. Cost is \$100 and the maximum enrollment is twelve.

For older kids, grades 7-10, the class "Marsville: The Cosmic Village" will be a fascinating fact-finding series of experiments centered around a simulated mission to Mars. Problem-solving, critical thinking and communication skills will develop as the participants work together as teams to build a closed environment integrating air supply, temperature control, food delivery and waste management systems. Math, science and technology are integrated into this program by COSC staff instructors Lisa Hoover and Eric Havel. The course, which is limited to 35, will be July 26-30, and the cost will be \$130.

Further details on all of these classes are available by calling (510) 530-3480 x22.

Another way to spark an interest in your children this summer is to hand them a planisphere and a telescope or binoculars and shove them out the door and into the night.

## Comet Comments *By Don Machholz*

Comet LINEAR (1998 T1) is in the morning sky while Comet LINEAR (1998 M5) fades in the evening sky. The SOHO satellite found a new comet on images taken February 6. Comet SOHO (C/1999 C1) was a Sungrazer seen only from space. Meanwhile the Lick Observatory Supernova Search found a new comet on March 17. Comet Li (1999 E1) remains faint and is dimming.

Comet Hunting Notes: Of the 79 comets visually discovered since 1975, 36 were found in the southern sky. These southern discoveries were not evenly spaced throughout the year. Exactly half of them took place in about three months—between November 23 and February 25. (During that same time only eight Northern Hemisphere finds occurred.) Good summer weather in the Southern Hemisphere does not account for all the finds; eight of those 18 discoveries were made by Northern Hemisphere comet hunters searching the southern skies. So when did Northern Hemisphere finds prevail? Between mid-March and mid-June, 11 of the 12 finds occurred in the northern sky.

Date (UT)	R.A. (2000)	Dec.	Elong.	Sky	Mag.
C/1998 M5 (LINEAR) [Lynx]					
05-02	08h33.5m	+47°39'	79°	E	10.4
05-07	08h38.2m	+44°31'	76°	E	10.6
05-12	08h43.0m	+41°37'	73°	E	10.7
05-17	08h47.8m	+38°55'	69°	E	10.9
05-22	08h52.5m	+36°25'	66°	E	11.1
05-27	08h57.2m	+34°06'	63°	E	11.2
C/1998 T1 (LINEAR) [Pisces-Aquarius]					
05-02	23h36.6m	-03°33'	48°	M	10.7
05-07	23h36.5m	-04°04'	53°	M	10.5
05-12	23h35.9m	-04°44'	58°	M	10.2
05-17	23h34.7m	-03°53'	64°	M	10.0
05-22	23h32.6m	-06°36'	69°	M	9.7
05-27	23h29.3m	-07°58'	76°	M	9.4
06-01	23h24.4m	-09°45'	82°	M	9.1
06-06	23h16.9m	-12°09'	90°	M	8.8
06-11	23h05.6m	-15°28'	98°	M	8.4

### Eastbay Astronomical Society

President:	Carter Roberts	(510) 524-2146
Vice President, Secretary:	Phil Grabbe II	(510) 655-4772
Treasurer, Membership:	Don Stone	(510) 733-6738
Board of Directors:	Anne S. Creese	(510) 638-1702
	Franklyn G. Creese	(510) 638-1702
	Alan R. Fisher	(510) 533-8434
	Terry R. Galloway	(510) 841-9774
	Conrad Jung	(510) 532-8580
	Bill Levinson	(510) 428-2779
	Louise M. Predovic	(510) 523-1096
	Alan Roche	(510) 891-0412
	David Rodrigues	(510) 483-9191
	George Roush	(925) 687-0912
	Ken Swagerty	(510) 223-6143
	Paul Zurkowski	(925) 447-6837
Immediate Past President:	Betty Neall, <i>ex officio</i>	(510) 533-2394

Articles and photos for *The Refractor* are encouraged. The June issue will be produced by President Carter Roberts. Please submit articles to him by e-mail at [cwroberts@earthlink.net](mailto:cwroberts@earthlink.net) before May 15. For further information please call Carter at (510) 524-2146.

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

## Reynolds Wrap

By Mike Reynolds, Ph.D.  
Executive Director

The parallel was too close. I can remember being at many launches of the Space Shuttle. Often the day would begin with the early morning Florida fog, yet you could see the Shuttle on the pad. The giant Rotating Service Structure would move away from the Orbiter, an indication that a launch would soon occur. Cameras were ready, including remote cameras that allow for photography from unsafe areas. Reporters were directed to the press site; the visitors' gallery was prepared and ready.

Weather would occasionally cause a delay. And with military shuttle launches, everyone was told the launch would occur "around this time."

The Science Center had its own shuttle-like launch: the placement of the 80-ft diameter, 17,300 pound green exterior planetarium dome. The dome had been assembled on the ground by the manufacturer, Temcor. The plan was to lift the dome into place on Tuesday, 6 April; however poor weather caused a one day "scrub."

The dome launch was rescheduled for Wednesday, 7 April at 9:00 AM. The morning was foggy! The crane next to the dome reminded me of the Shuttle's Rotating Service Structure. Carter Roberts and I were there early placing Carter's camera equipped with a 15-mm (fisheye) lens in the planetarium. The camera had a remote shutter trip, so Carter could safely take photographs from up to 350 feet away. The areas for the press and visitors were prepped; I did an interview with KPIX at 7:30 AM, with additional press from KRON, KGO and the Oakland Tribune arriving at 8 AM.

The plan was to "launch" at 9 AM. However the weather report suggested that as the fog dissipated, the wind would pick up to beyond lift tolerances. So a decision was made (much like those "surprise—it's time to launch" military shuttle missions) that the dome would be launched—er, lifted early. I turned to Carter and remarked "Hey look, the dome is off the ground!" In less than a minute (fast—again like a shuttle launch) this green 80-ft. diameter dome was whisked through the fog, looking much like a UFO. Cameras were whirling in the background. Unfortunately, due to the early lift, some people missed the show. I can understand their disappointment, but also support the need to get the dome in place safely. A green 80-ft. flying saucer blowing through Redwood Regional Park would not have been a good thing to watch.

This was indeed a major milestone in the construction of the new Chabot Observatory & Science Center. The parallels to a shuttle launch are appropriate as we prepare for the launch of this new facility in about a year.

Keep looking up!



## Roberts Rules

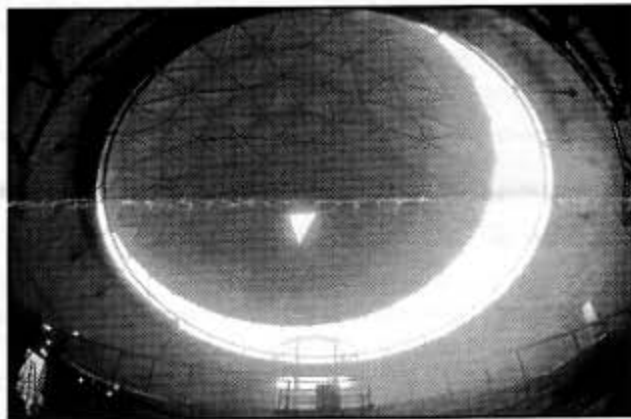
By Carter Roberts

An alien flying saucer descended from the clouds over Oakland early on April 7. It landed in Joaquin Miller Park on top of a mysterious cylinder. A remote controlled camera took the photo reproduced here. By the time you read this we intend to have shown this to those of you who participated in the tree cutting work party. We hope you survive this alien encounter.

Astronomy Day is coming up again on Saturday, May 22. At Chabot, EAS will be hosting an open house and viewing session. Dave Rodrigues will do his very popular "How Big is the Universe" show at 7:30 PM beginning in the Space Science Classroom then continuing upstairs where Alan Fisher will operate the Planetarium. As usual, we ask members to bring telescopes to set up outside the Observatory; and the Telescope Makers' Workshop will be open from 7 to 10 PM. Mars will be well placed and 15 arcseconds across so should be a good target for Rachel. While details have not yet been finalized, we expect to have a joint EAS-COSC outreach event during the afternoon at Barnes & Noble in Jack London Square. We will probably have two or three telescopes outside showing the Sun in hydrogen  $\alpha$ , the Moon and maybe even Venus. Last year we were so busy there we continued long after dark. We will have more details and be signing up volunteers at the May 1 meeting; or contact Carter Roberts at (510) 524-2146 or [cwroberts@earthlink.net](mailto:cwroberts@earthlink.net).

We expect to publish a new EAS membership list for the non-commercial use of members. We hope to include as many e-mail addresses as possible and may even try to include members' web sites if you provide us with that information. If you have any updates or additions, please send them as soon as possible to Membership Registrar Don Stone at [ddcstone@earthlink.net](mailto:ddcstone@earthlink.net) or 5119B Ray Ave, Castro Valley, CA 94546-2511. Members may obtain the list at the July meeting or by mail for a \$1 fee. If you do not want your address or phone number included, please let Don know right away.

Any members of EAS who may have any personal belongings stored in the basement of the Chabot Observatory would do well to take steps down to the basement, then up again with arms laden with stuff. A dumpster will arrive on May 16, after which time you won't have to worry about whether you have any stuff down there or not. Chabot will be cleaning up the basement of the Observatory and making an inventory of things that will be moved to the new building. Most of the items to be moved are machine tools, telescope parts and boxes of journals for the library. Anyone storing personal items there must do something with them by May 16 or they may go into the dumpster. Lynn Condit (510 530-3480 x13) is in charge and Alan Fisher (510 533-8434) will be helping since he knows better that most what belongs to whom.



## DATELINE MAY

- 5 1961 Freedom 7 (Mercury), first American in space  
Alan Shepard, suborbital
- 30 1966 Surveyor 1 launched  
First American soft landing on the Moon
- 30 1971 Mariner 9 launched, first Mars orbiter
- 14 1973 Skylab, first American space station, launched
- 
- 8 1999 Last Quarter Moon, 10:30 PDT - 17:30 UT
- 15 1999 New Moon, 05:05 PDT - 12:05 UT
- 21 1999 First Quarter Moon, 22:33 PDT  
= 05:33 UT 22 May
- 29 1999 Full Moon, 24:40 PDT - 06:40 UT 30 May
- 30 1999 Pluto at opposition, 1700 PDT  
= 0000 UT 31 May

Eastbay Astronomical Society lecture meetings will be presented on the first Saturday of the month through July, then will switch to the third Saturday of each month until the end of the year.

## FUTURE CONJUNCTIONS

### May

- 1 7:31 PM EAS Meeting, Norm Sperling,  
Take a Nebula, Condense and Stir
- 13 7:30 PM EAS Board meeting, Chabot
- 22 Astronomy Day

### June

- 5 7:31 PM EAS Meeting, Dr. Saul Perlmutter  
Expansion of the Universe
- 10 7:30 PM EAS Board meeting, Chabot
- 21 Summer Solstice

## Chabot Observatory Programs - May

**An Evening on Mars** - Saturday, May 1

### **Star Station One**

Friday and Saturday evenings, May 14, 15, 28, 29

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

Learn about what's happening with the International Space Station through hands-on activities and demonstrations designed by NASA. The planetarium show *The Sky Tonight* is included, following the *Star Station One* presentation; and telescope viewing is included, weather permitting.

Admission is \$5.00 for adults, \$4.50 for seniors, \$3.50 for children 6-17. Chabot Observatory & Science Center members are admitted free. EAS members are admitted free if space available. The show begins at 7:30.

**Eastbay**  **Astronomical Society**

4917 Mountain Boulevard • Oakland, California 94619

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Ellis Myers C1099  
Editor  
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