



The Refractor

The Bulletin of the Eastbay Astronomical Society

Founded in 1924 at Chabot Observatory, Oakland, California

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The Mars Pathfinder Mission: Return to the Martian Surface

Saturday, 5 October, 7:30 p.m.

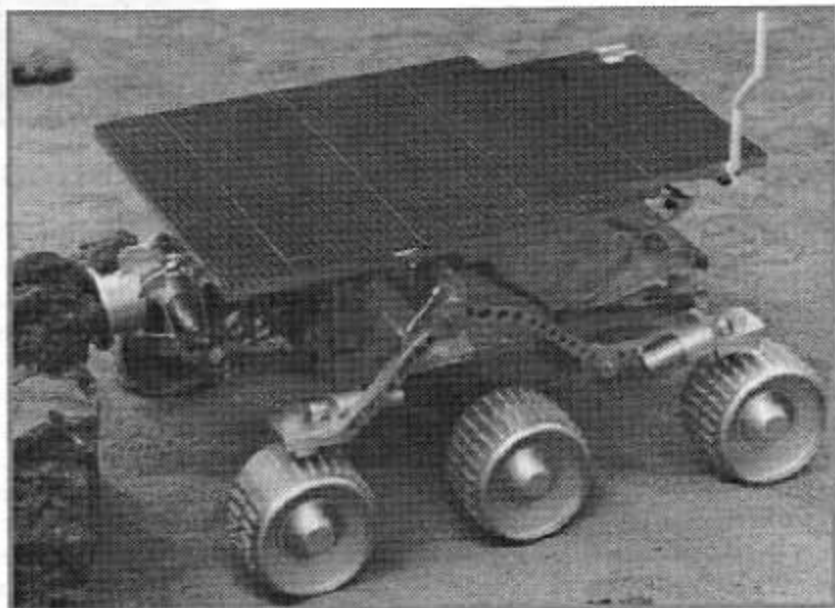
Lecture Room, Chabot Observatory
4917 Mountain Boulevard, Oakland

Dr. James R. Murphy

San Jose State University and NASA Ames

It has been 20 years since the Viking landers set down upon the Martian surface, and 14 years since the last data were received from them. The Mars Pathfinder lander will reestablish our presence on the surface and extend our knowledge. Pathfinder was formulated as a technology demonstration mission; and it has grown to include science aspects ranging from elemental composition of soil and rocks to meteorology. The mission possesses several novel aspects, including the deployment of a non-tethered rover named Sojourner. Dr. Murphy will describe the mission and the science instruments on board the lander. He will also discuss Pathfinder's place in the queue of spacecraft missions slated to be sent to the Red Planet in the next decade.

Dr. Jim Murphy is a Research Associate with the San Jose State University Foundation and conducts his research activities into Martian atmospheric processes at NASA's Ames Research Center in Mountain View, California. He received his Ph.D. in Atmospheric Sciences from the University of Washington in Seattle in 1991. He is the Deputy Director of the Mars sub-node of the Planetary Atmospheres Node of NASA's Planetary Data System (PDS). He currently is involved in various aspects of the upcoming Mars Pathfinder, Mars Global Surveyor orbiter, and Mars '98 lander spacecraft missions.



Mars Pathfinder's microrover Sojourner is a 6-wheel vehicle designed to traverse obstacles a wheel diameter (13 cm) in size.

The Mars Pathfinder Project is part of a series of studies leading to placement of a network of weather and seismology stations on Mars.

Pathfinder is scheduled for launch on December 2, 1996 aboard a Delta rocket. The spacecraft will enter the Martian atmosphere directly on July 4, 1997 without going into orbit around the planet. The lander will be taking atmospheric measurements as it descends through the Martian atmosphere. The entry vehicle's heat shield will slow the craft; an onboard computer will sense the slow-down in speed and then deploy a large parachute, which will further slow the lander; and at 100 meters above the surface the lander's external air bags will be inflated. Seconds later, three solid rocket motors placed inside the top half of the entry vehicle will be fired. In about two seconds, the rockets will bring the lander to a stop some 12 meters above the Martian ground. The parachute will be released, and the lander, nestled inside its protective air bag cocoon, will fall to the ground, bouncing and rolling until it stops. After impact on Mars, the lander will deploy its three solar panels for power, the camera will take a panoramic image of its surroundings and the rover will extend to its full height (28 cm) and roll down a ramp to the surface. Sojourner will then be independent except for using the communications functions of the lander for contact with Earth.

DINNER WITH THE SPEAKER

5:28 p.m., 5 October 1996

PEARL OF SIAM RESTAURANT

5498 College Avenue, Oakland (510 / 420-8600)

Please call Betty Neall at 510 / 533-2394 by Friday, 4 October to confirm your place. Please be on time to allow ample time for dinner and to facilitate a prompt meeting time of 7:30 p.m.

Pegasus

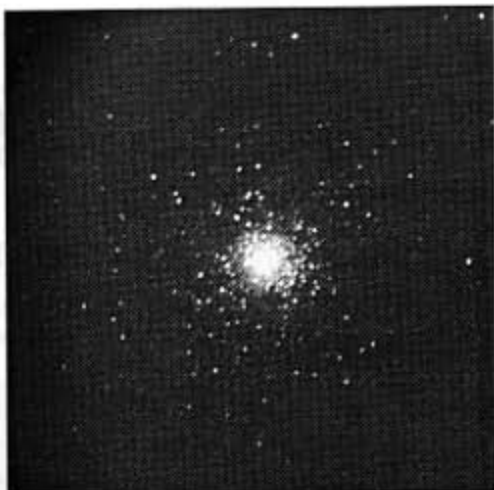
dominates the night in autumn, one of the first constellations a beginner learns to recognize. The great square crosses the meridian at ten p.m. on October 15, and by knowing the square one can easily find some of the other star groups: Cepheus, Andromeda, Cassiopeia, and other characters in the well-known story of Greek mythology. The square can also be used as a direction finder to certain stars. Scheat and Markab, the "upper" and "lower" corners on the right (west) lie nearly north and south of each other; so by extending an imaginary line beyond Scheat five times the distance between the two stars one will find the North Star. Another way of locating Polaris would be to draw a line from Alpheratz (in the upper left corner of the square) through Caph, the left-most star in the "W" of Cassiopeia an equal distance beyond. To find the first-magnitude star Fomalhaut look in a straight line from Scheat through Markab and to the south three square-side lengths beyond. However, unless Pegasus is high in the sky you'll bump into the horizon before you'll see this "eye of the Southern Fish."

Pegasus is the home of a really nice star cluster, known as M15. This large ball of stars is about a fifth of a degree in diameter as seen from our distance of 34,000 light years. It can be seen in binoculars, but is best in a small telescope. Because this object exhibits as a strong X-ray source, astronomers postulate that the dense crowding of the clustered stars gives rise to interactions that result in the stripping away of electrons from the stellar material, thus generating the vast release of energy we see as X-rays.

M15 is at the western edge of the constellation, near Equuleus and Delphinus. Because the story of Pegasus is well-known (*The Refractor*, October 1994), we'll skip over to the Dolphin for this month's sky lore. It's a story from the Cochiti Pueblo of New Mexico, and refers to the Slingshot Stars, the stars of present-day Delphinus.

The matriarch of the ancient ones gave to a little girl, Kotcimanyako, a small bag of white cotton and entrusted her to carry the bag with her at all times on the journey the tribe was making to a distant land. Kotcimanyako was not to open the bag no matter what happened. Walking alone and trailing the procession, the girl wondered about many things, including, of course, just why she was forbidden to know what was in the bag. She was overcome by curiosity, and at lunchtime, she decided that one little peek couldn't possibly be of any great concern.

She began to untie the knots that closed the bag, and as she worked to loosen the last of these, something popped out, then another and another, then many more, scattering into the sky. She grew frightened and quickly worked to recapture as many as she could and stuff them back into the sack. When the trip was at last ended, Kotcimanyako unwrapped the few stars—for that is what the somethings were—and the elders placed them in their proper places in the sky and gave the patterns names. Those stars that had escaped are those for which the elders had not given names and they are scattered about without distinction. But we do know the names of the Slingshot Stars (Delphinus), the Shield Stars (Big Dipper) and some others.



M15 is a showpiece for small telescopes. This photo by Conrad Jung was taken through Rachel, the 20-inch refractor at Chabot Observatory. Conrad used a 40-minute exposure on Fuji SG800 film, with the telescope working at f/10 using a telecompressor.

Astronomy Day Activities in the San Francisco Bay Area

The Astronomical Association of Northern California has designated Saturday, October 19 as the second Astronomy Day of 1996. There will also be activities on Friday the 18th in some locations.

Saturday evening there will be an open house at **Chabot Observatory** beginning at 7 p.m. The planetarium show begins at 7:30 p.m. and will be half price in honor of Astronomy Day. EAS members are admitted free. There will be a 10% discount on items in the Starry Nights Gift Shop. There is no charge to view through the 8-inch and 20-inch telescopes. Additional information will be available on the COSC web site at <http://www.cosc.org> with recorded information at (510) 530-5225.

Mt. Diablo Astronomical Society will have a public stargazing session on Mt. Diablo on October 19th starting around 7:30 p.m. Contact person: Don Charles: 510-676-6973; recorded info phone: 510-930-7431; e-mail: Marni Berendsen at: Berendsen@aol.com.

The gate to the park is locked at sunset. People will be escorted out at various times during the evening.

The San Jose Astronomical Association designates its Friday, October 18 public star party as an Astronomy Day event. Location is Hogue Park in San Jose. Starting time, 7:00 p.m.

People may also call their hot line, at (408) 559-1221; or visit their web site at <http://www.rahul.net/resource/sjaa>.

Fremont Peak Observatory will have a public star party from 8 p.m. until midnight, with slides and with viewing through the 30-inch telescope from dark skies. Contact: Denny Medlock (510) 339-9224.

Tri-Valley Astronomers will observe Astronomy Day, beginning at 8 p.m. from Sycamore Grove Park in Livermore (Wetmore Road entrance). Call Dave Anderson at (510) 661-4249.

EAS Officers

President:	Carter Roberts	(510) 524-2146
Vice President:	Phil Crabbe II	(510) 655-4772
Secretary:	Kevin Cox	(510) 528-2181
Treasurer, Membership:	Don Stone	(510) 733-6738

Doing Your Own Satellite

Sighting Predictions

is fun and easy. All you need is a computer and a modem. To get going you'll need two things: a satellite prediction program for your computer and the orbital elements of the satellite or satellites you're trying to predict. Both are easily available over your modem through various bulletin boards.

I use a shareware program called "Quicksat," by a Texan called Mike McCants. His e-mail is mike@comshare.com and his phone number is (512) 452-6081. He can also be reached at the "Celestial BBS" (Bulletin Board System). His program is optimized for visual observing of satellites. It provides an estimate of visual magnitude as well as RA and Dec coordinates, which comes in handy if you're trying to plot the path of the satellite on a star chart. It can also go through a large data base of satellites quickly and tell you which will be visible at any particular time. It allows you to choose your own "filters" — the restrictions you wish to put on the selection of satellite sightings for your observing program. For example you can choose the magnitude, elevation of the satellites above the horizon, sun elevation below the horizon, dates and time. It provides tabular output rather than beautiful graphics. It is available through the AANC bulletin board "Eyes on the Skies" at (510) 443-6146. This service is run by Mike Rushford, a Tri-Valley member and a very friendly and computer-knowledgeable fellow. If you have trouble, his home phone is (510) 443-8489. Mike was the EAS speaker in January, 1996.

For gorgeous graphics and various views of where the satellites are located with respect to the Earth, I highly recommend "STS PLUS" by Dave Ransom. Dave runs a bulletin board in Southern California called RPV (Rancho Palos Verdes). The number is (310) 544-8977 or (310) 544-8977. His BBS emphasizes Space Shuttle and satellite observing information.

Now that you have your satellite prediction program, you need the latest orbital elements for the satellites you wish to observe. I usually use the RPV bulletin board to get the CSS/Molczan (Canadian Space Society/Ted Molczan) set because he includes various secret spy satellites in his data base, something that the US Air Force doesn't include for some reason. You will see it listed as N2L33X.ZIP. N2L stands for two-line elements and ZIP tells us the file is "zipped," a type of file compression. 33X is just the number of that set. This data base includes about 800 satellites and works well with "Quicksat." There are various other data bases compiled by other people. There are data bases of easily observed satellites, astronomy satellites, weather satellites, spy satellites, the comprehensive NORAD catalogue (North American Air Defense Command), individual satellites and pretty much every permutation one can imagine. There have been over 24,000 objects tracked, each with its own NORAD number. Many thousands are still up there.

Having chosen your database, you now download the file from the bulletin board over your modem into your computer the same way you would download any other file. Most of these files are compressed so that downloading is faster. You'll have to know what compression program the bulletin board is using and

download a copy of it if you don't have it already. The BBS operator usually announces what compression program he's using when you sign on. After downloading your satellite element set, decompress it and place it in the same directory as your satellite program. Then set the filters (variables) of your satellite program and follow its instructions. It will now give you your output in tabular or graphical form. Remember that the elements are not constants, and so you will need to refresh the data set periodically with the latest available information.

By the way, if all you want is a Shuttle or Mir prediction and you have access to the Internet you can look sightings up at <http://shuttle.nasa.gov/current/orbit/orbiter/sighting>. Another helpful Internet site for satellite observing is the Air Force Institute of Technology <ftp://archive.afit.af.mil/pub/space>.

That's really all there is to it! Congratulations! You are now a "satellite expert." If you have any questions, feel free to call me at (510) 483-9191 or e-mail me at davevrod@aol.com.

By Dave Rodrigues

A New Observatory Breaks Ground at Sugarloaf Ridge

State Park in Sonoma County, near Kenwood and Glen Ellen. On Sunday, September 15, the Valley of the Moon Observatory Association moved visibly closer to bringing views of Comet Hale-Bopp to their community by year's end. The Robert H. Ferguson Observatory will house the VMOA's 40-inch telescope in the first unit of a three-step building project. The project will be completed, when funds are available, with a second sliding-roof observatory for a 20-inch reflector; the twin observatories will be linked by a classroom and meeting hall.

But the shovels have turned the earth, and construction is under way. More than 100 persons attended the event. They heard short talks by George Loyer, president of VMOA, Bud Getty, District Superintendent for the California State Department of Parks and Recreation, and from June Ferguson, Secretary of VMOA and widow of the astronomer for whom the new observatory is named. Loyer and Ferguson then wielded the ceremonial shovels within the outline of the building; others were urged to participate in preparing for the foundations. EAS was represented by *Refractor* editor Ellis Myers.

Construction of the building, located adjacent to the parking lot of the group camp at the state park, is going ahead with the goal of completing the housing for the 40-inch telescope as quickly as possible. The public and potential contributors can then see that the project is real, serious, and on its way to completion. Over \$40,000 has been raised so far, and this amount represents about one third of the goal.

The dark skies of this site, little over an hour away from the central Bay Area, seems promising as a location for EAS members interested in astrophotography or deep-sky viewing. Charter members of VMOA, a subsidiary of the Valley of the Moon Natural History Association, will have preference in access to the telescopes for personal use. For further information about Docent opportunities or about subscriptions please contact George Loyer at VMOA, P.O. Box 898, Glen Ellen, CA 95442. Their Web page is at <http://yorty.sonoma.edu/VMOA>.

Roberts Rules

EAS elections are coming up in December. This is your chance to put some new life into the EAS. The nominating committee consists of V.P. Phil Crabbe (510) 655-4772, Franklyn Creese, (510) 638-1702, and Conrad Jung, (510) 532-8580 or leave voice mail for him at Chabot at 530-3480 x 31. Nominations will close at the November lecture meeting and the election will take place at the December meeting.

Last month we reported that Nancy Cox had an article published in *Mercury*, the journal of the ASP. This month we report that *Refractor* editor Ellis Myers is represented in the September/October issue of that same journal. Ellis was co-winner of the Mercury puzzle contest, and a word puzzle he invented is published for all to test their mental agility.

EAS members who are registered voters in Oakland have three items of interest on the ballot this November.

EAS member Rena Rickles, who donated a considerable amount of time to the creation of the Joint Powers Agreement that produced the COSC is running for the Oakland City Council. It would be really nice to have another friend on the City Council.

Measure B is a parcel tax for the Oakland Unified School District that would provide money for educational enrichment. Indications are that science will be one of the subjects enriched by this tax. There is also a General Obligation Bond, Measure I, nicknamed the "GO Bond" that provides money for "warm and fuzzy" things such as the Zoo and the Oakland Museum. If it can get the two-thirds vote it needs, there will be about \$6,500,000 for the Chabot Observatory & Science Center! Vote early and often! (Just kidding—but do vote!)

In Oakland, the Chabot Observatory & Science Center will break ground for their new 70,000 square foot astronomy-oriented public science facility in Joaquin Miller Park on Friday, October 18, at 10 a.m. Buzz Aldrin, the second person to walk on the Moon, will be there. With only limited parking space available now at the site, attendees are asked to park at the Roberts Regional Park and take the free shuttle bus provided.

On Saturday, October 19 between 1 and 3 p.m. Buzz Aldrin will speak about, and then sign copies of his new science fiction book *Encounter with Tiber*. This will take place at the Moore auditorium at the Oakland Museum. Proceeds will benefit the Chabot Observatoary & Science Center.

On September 18, the COSC Board of Directors voted to purchase a Zeiss Universarium VIII TD Planetarium Projector to install in the new facility. The total cost will be \$2,885,534.

Please welcome as new EAS members:

Dave Abercrombie Family	Oakland
Bob Brylawski Family	Oakland
Ian Conger	Fremont
Glen Dahlbacka	Oakland
Renee Drefus	Pt. Richmond
Yvonne Malloy and Lonhyn Jasinskyj	Santa Clara
Richard Spector Family	Oakland
Shayna Stanis	Kensington
Mike White and Sharon Kornhaus	Fremont

Encounter With Tiber

is Buzz Aldrin's science fiction novel, co-authored with John Barnes. In the words of Dr. Arthur C. Clarke, author of *2001: A Space Odyssey*, "I'm quite stunned—I think *Encounter With Tiber* is a classic. Its scope is astonishing, and it contains much wisdom and profound philosophy." Dr. Aldrin is currently on an extensive worldwide book tour. He is expected to be a guest at the ground-breaking rites at COSC on 18 October, and will sign copies of his new novel on the following day, which is Astronomy Day, at the Oakland Museum from one until three p.m.

As a space futurist and scientist, Buzz Aldrin has a vision to share of the future of man's exploration outward to the planets and the stars. He has written two other books, *Men From Earth* and *Return To Earth*, based on his experiences as one of America's leading astronauts.

He has made numerous television appearances spanning the media's full scope of entertainment, including the David Letterman Show, Larry King Live, Oprah Winfrey, Ted Koppel's ABC Nightline, CNN, BBC, C-Span, and many more. He frequently publishes articles and opinion editorials setting forth his innovative ideas and designs for space exploration. For his development of a tetrahedron space station design, he received a patent from the US Patent and Trademark Office.

Buzz Aldrin is currently endorsing two exciting and educational products for children: the computer software game, *Buzz Aldrin's Race Into Space*, and the multimedia interactive book on computer, *Space Adventure*. In April 1995, the Buzz Aldrin Elementary School (the "Aldrin All-Stars") was dedicated in Reston, Virginia.

Buzz Aldrin continues to participate actively in the space community by serving on space advisory councils and boards, as well as government panels. He is internationally recognized as a dynamic and inspiring speaker.

Apollo 13 Commander

Jim Lovell has officially launched Mission HOME (Harvesting Opportunity for Mother Earth), a multi-year drive to captivate and educate the American public about the benefits and wonders of space. Lovell, who serves as chairman of Mission HOME, was joined by representatives of two nonprofit space organizations and 16 corporations that have created the initiative to "Take Up Space."

The campaign seeks to teach and learn from the American people how space endeavors can help improve life on Earth, through activities such as a series of meetings called "Town Halls in Space." The national campaign will stress the excitement of space through space-themed entertainment and marketing initiatives. A Mission HOME Space Education Alliance has been established to encourage the use of space studies as a tool to interest children in math, science, and technology.

Mission HOME encompasses all aspects of the American space community, including NASA; the National Oceanographic and Atmospheric Administration; the commercial community, including the private satellite industry; and military space.

For more information about this program, contact Mission HOME at 1-800-SPACE-US.

Comet Comments *By Don Machholz*

Comet Hale-Bopp, brightening as expected, has been displaying a J-shaped tail nearly a degree long. It passes near the globular cluster M14 during the last week of October. Comet NEAT and Comet Brewington remain in the evening sky; both are slowly fading in brightness. I've also included an ephemeris for Periodic Comet Machholz 1, which passes closer to the Sun than any other periodic comet. It will be a difficult object in twilight, but may also be brighter than suggested here. Periodic Comet Kopff has faded from view.

A new comet was visually discovered on August 19 by Vello Tabur of Wanniasa, of the Australian Capital Territory. The comet was very diffuse, magnitude 11, and near the constellation Orion in the morning southern sky. Comet Tabur may reach naked-eye visibility in the morning sky in October. Its orbit is similar to that of Comet Liller, discovered in 1988. Apparently the two comets were one in the past; they take 2900 years to orbit the Sun.

A new comet was discovered on September 7 by Carl Hergenrother on plates exposed by Timothy Spahr of the University of Arizona. No orbit has been determined and it is presently known as simply Comet 1996 R1. The 12th-magnitude object was found near the Andromeda Galaxy and moving westward at about two degrees per day.

The NEAT program, mentioned here last month, discovered an object that appears asteroid-like (stellar) but it's in a comet-like orbit. Known as 1996 PW, it takes 6900 years to orbit the Sun and was at perihelion this August 8 at 2.5 AU. At its most distant point it is 360 AU away. It is not expected to get brighter than magnitude 16.

On the flip side of that story, in early August, Eric Elst reported the discovery of a comet on photos taken in mid-July by Guido Pizarro. This object shows a tail, but no coma, and it is in an asteroid-type orbit between Mars and Jupiter, taking 5.6 years to circle the Sun. In 1979 it was announced to be an asteroid (1979 OW7), but now that it shows cometary activity, it is renamed Comet P/1996 N2 (Elst-Pizarro). It remains near magnitude 17.

Finally, I surpassed 6000 hours of visual comet hunting last month. I began in January 1975. I still enjoy it.

Date (00UT)	R.A. (2000)	Dec.	Elong.	Sky	Mag.
C/1995 O1 (Hale-Bopp) [Ophiuchus]					
09-29	17h29.7m	-05°04'	77°	E	5.0
10-04	17h29.9m	-04°50'	72°	E	4.9
10-09	17h30.6m	-04°35'	68°	E	4.8
10-14	17h31.8m	-04°20'	63°	E	4.8
10-19	17h33.5m	-04°04'	59°	E	4.7
10-24	17h35.6m	-03°47'	55°	E	4.6
10-29	17h38.1m	-03°29'	51°	E	4.5
11-03	17h41.0m	-03°09'	48°	E	4.4
11-08	17h44.3m	-02°47'	44°	E	4.3
C/1996 Q1 (Tabur)					
[Gemini-Auriga-Lynx-Ursa Major-Canes Venatici-Boötes]					
09-29	06h54.1m	+28°53'	84°	M	6.2
10-04	07h53.5m	+41°31'	80°	M	5.7
10-09	09h31.4m	+52°25'	73°	M	5.5

10-14	11h35.3m	+55°55'	68°	M	5.5
10-19	13h12.2m	+52°44'	63°	M	5.7
10-24	14h10.0m	+47°32'	59°	E	5.9
10-29	14h44.2m	+42°34'	57°	E	6.2
11-03	15h05.8m	+38°16'	54°	E	6.4
11-08	15h20.6m	+34°35'	52°	E	6.7

C/1996 N1 (Brewington) [Draco-Cygnus]					
09-29	17h23.7m	+58°06'	84°	E	11.1
10-04	17h59.9m	+58°04'	88°	E	11.3
10-09	18h36.3m	+57°27'	92°	E	11.5
10-14	19h11.6m	+56°16'	96°	E	11.8
10-19	19h44.6m	+54°36'	99°	E	12.0
10-24	20h14.9m	+52°33'	102°	E	12.2
10-29	20h42.2m	+50°15'	105°	E	12.5
11-03	21h06.5m	+47°48'	107°	E	12.7
11-08	21h28.2m	+45°18'	108°	E	13.0

C/1996 E1 (NEAT) [Cygnus-Vulpecula-Sagitta]					
09-29	19h04.7m	+55°57'	98°	E	10.5
10-04	19h19.2m	+48°17'	100°	E	10.6
10-09	19h30.8m	+40°58'	100°	E	10.8
10-14	19h40.6m	+34°12'	99°	E	11.0
10-19	19h49.2m	+28°08'	98°	E	11.3
10-24	19h57.0m	+22°48'	95°	E	11.5
10-29	20h04.3m	+18°11'	92°	E	11.8
11-03	20h11.2m	+14°12'	88°	E	12.0
11-08	20h17.7m	+10°48'	85°	E	12.3

96P/Machholz 1 [Hydra-Corvus-Virgo-Libra]					
10-04	12h31.7m	-30°35'	26°	E	8.5
10-06	12h31.8m	-27°13'	22°	E	7.7
10-08	12h32.3m	-23°20'	18°	E	6.8
10-10	12h33.7m	-18°48'	14°	E	5.6

—Too close to the Sun for observation—

10-24	14h34.5m	-02°27'	14°	E	8.4
10-26	14h49.6m	-03°23'	15°	E	9.3
10-28	15h03.0m	-04°18'	16°	E	10.0
10-30	15h15.1m	-05°12'	16°	E	10.7
11-01	15h26.2m	-06°03'	17°	E	11.2
11-03	15h36.4m	-06°52'	17°	E	11.7
11-05	15h45.9m	-07°37'	18°	E	12.2

Elements for C/1995 O1 (Hale-Bopp):
 Perihelion: 0.9170703 AU [1997 03/31.86770]; Arg. (2000): 130.40061°
 Ascending node (2000): 282.46983° Eccentricity: 0.99674010
 Inclination (2000): 089.38442° Orbital period: 4700 years

Elements for C/1996 Q1 (Tabur):
 Perihelion: 0.8420208 AU [1996 11/03.56197]; Arg. (2000): 057.23424°
 Ascending node (2000): 031.51643° Eccentricity: 1.0
 Inclination (2000): 073.23424° Orbital period: Long period

Elements for C/1996 N1 (Brewington):
 Perihelion: 0.92581470 AU [1996 08/03.42395]; Arg. (2000): 043.96932°
 Ascending node (2000): 234.90202° Eccentricity: 1.004799
 Inclination (2000): 052.14766° Orbital period: Long period

Elements for C/1996 E1 (NEAT):
 Perihelion: 1.3585919 AU [1996 07/27.36189]; Arg. (2000): 81.12936°
 Ascending node (2000): 149.84329° Eccentricity: 1.0005638
 Inclination (2000): 114.47220° Orbital period: Long period

Elements for 96P/Machholz 1:
 Perihelion: 0.1247178 AU [1996 10/15.06962]; Arg. (2000): 014.58608°
 Ascending node (2000): 094.53200° Eccentricity: 0.9586366
 Inclination (2000): 60.07415° Orbital period: 5.24 years

DATELINE OCTOBER

- 25 1882 Robert Goddard, born
1 1897 Yerkes Observatory, University of Chicago,
dedicated, largest refractor, 40 inches
14 1947 First supersonic flight, Chuck Yeager
4 1957 Soviet Sputnik 1, first artificial satellite
1 1958 NASA established
3 1996 Venus 0.2° south of Regulus, closest 1996
conjunction of a planet and 1st-magnitude star
4 1996 Last Quarter Moon, 12:06 PDT = 12:05 UT
12 1996 New Moon, 13:06 PDT = 14:13 UT
19 1996 First Quarter Moon, 04:23 PDT = 18:09 UT
26 1996 Full Moon, 19:50 PDT = 14:10 UT
27 1996 Daylight Saving Time ends. 02:00 PDT = 01:00 PST

FUTURE CONJUGATIONS

- 5 October. EAS Lecture. 7:30 p.m.
**Dr. James R. Murphy, Mars Pathfinder
Mission: Return to the Martian Surface**
10 October. EAS board meeting. 7:30 p.m.
18 October. COSC Ground-breaking. 10 a.m.
19 October. Astronomy Day.
2 November. Astrolmage '96, Fullerton.
Contact John Sanford (714) 722-7900.
jonsanf@interserf.com
8 March, 1997. Total solar eclipse.
Mongolia, Siberia

Rotary-Chabot Planetarium shows. Fridays and Saturdays, 7:30 p.m.
Information, (510) 530-5225.

	October							November		
	4	5	11	12	18	19	25	26	1	2
The Dark of Night										
The Final Frontier										
The Sky Tonight										
Convicted by the Sun, Acquitted by the Moon										

Saturday, October 19 is

ASTRONOMY DAY

Tell your friends, and bring them to the
Open House at Chabot Observatory
Planetarium • Gift Shop • Telescope Viewing



Eastbay Astronomical Society, Inc.
4917 Mountain Boulevard
Oakland, CA 94619

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ADDRESS CORRECTION REQUESTED
Time Dated Material - Please Deliver Promptly