The Refractor

The Bulletin of the Eastbay Astronomical Society

Founded in 1924 at Chabot Observatory, Oakland, California

Volume 72
Number 9
May 1996

Comet Fever

Saturday, 4 May, 7:30 p.m.
Physics Classroom
Chabot Observatory
Lecture: Space Science Classroom
4917 Mountain Boulevard, Oakland

Don Machholz

Association of Lunar and Planetary Observers

Comet Fever is upon us! We have just been treated to the best comet in the past twenty or more years and another massive comet is heading our way. All of us have caught at least a bit of comet fever, a mysterious malady which, modern science notwithstanding, seems tied to the appearance of these ghostly apparitions. Emitting an ethereal and otherworldly (literally!) bluish-green light, these sirens of the solar system have entranced and seduced us. Perhaps now we can understand why mere mortals devote endless hours and dollars to capture one of these seductresses and put their names upon them, and so immortalize themselves.

We are fortunate that one of the world famous high wizards of this dark art is disguised as a mild-mannered member of our own astronomical society! I speak of course of Don Machholz, entrapper of no fewer than nine of these elusive phantasms and author of "Comet Comments", the internationally read monitor of these ephemeral spirits which appears regularly in this journal, and now also on the Internet and America On Line. He will inculcate us into the mysteries of this fascinating endeavor, giving us insight into this happy affliction from which he and others suffer. If you're not careful, you too may catch the madness!

Don will describe the latest thinking as to what these spectacular spectres are really made of, their impact (not literally, we hope) on humanity, his comet hunting program, and the observatory he built in Colfax. He will then discuss the monster comet, Hale-Bopp, coming our way and the observing prospects for it. Don will also have on sale his new book on Hale-Bopp for the bargain price of $10.00 (tax included), a savings of $2.87 over the list price.

Don Machholz was born in Portsmouth, Virginia on October 7, 1952. He has been interested in astronomy since age 8. He acquired his first 2-inch telescope on October 7, 1965; he began hunting for comets on January 1, 1975. He found his first comet on September 12, 1978 after 1700 hours of searching, and since has discovered nine comets over the course of 5900 hours of comet hunting! In 1990 Don and his family moved from San Jose to Colfax. In 1993 he built an observatory there from which he conducts his comet hunting at the rate of 270 hours (150 nights) per year. He is presently the Comet Recorder for the Association of Lunar and Planetary Observers. He has written three books, one of which is on Messier Marathons which Don has helped to develop and run. He is, without a doubt, one of the most distinguished and accomplished amateur astronomers on the planet. *By Dave Rodrigues*

Join us for

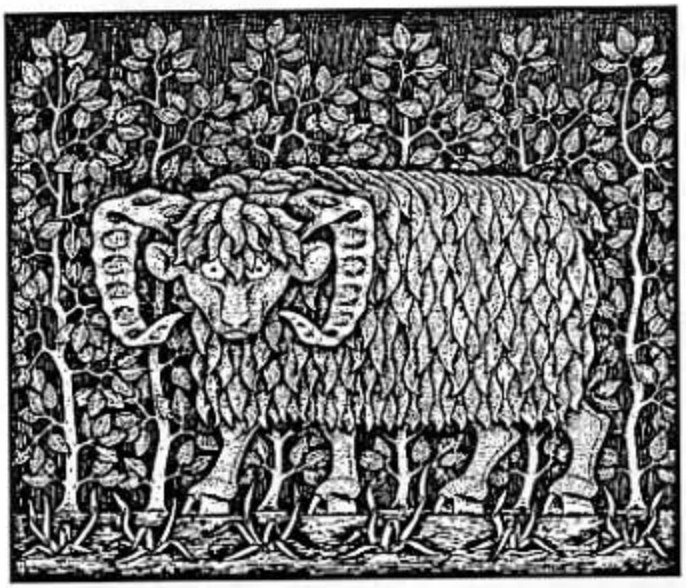
DINNER WITH THE SPEAKER

5:28 p.m., 4 May 1996

PEARL OF SIAM RESTAURANT

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

Please call Betty Neall at 510 / 533-2394 by Friday, 3 May 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.



The Ram of the Golden Fleece

is not considered a constellation of springtime, for the main stars of Aries cross the meridian at 11 p.m. in early November, and 7 p.m. in early January. The most convenient time for observation is in the fall; and in May this constellation is one of pre-dawn hours. Nevertheless, Aries is associated with the beginning of spring since in the ancient world the Sun entered the constellation at the time of the spring equinox. Thus Aries is the first of the Zodiac star groups–the Prince of all the signs. But this month Aries is host to Comet Hyakutake, and it may be possible to view the tail of the comet as it speeds away from the Sun following its perihelion on May 1.

The Greeks associated the constellation with the story of the Argonauts and the Golden Fleece. The early Chinese called it the Dog; later they knew it as the White Sheep; and with the stars of Taurus and Gemini, these stars were the White Tiger, the western one of the four great zodiac groups of China.

These four quarters of the ancient Chinese sky were occupied by four great celestial beasts, and they were also symbols for east, south, west and north. The four animals were the White Tiger, signifying autumn, the Black Tortoise of winter, the Dragon of spring and the Red Bird of summer. Each in turn through the year directed the universe, and it was not so much that these stars distinguished the seasons as that these creatures caused them. Thus the Dragon fought and conquered the Tortoise; and when the White Tiger doomed the Red Bird, it symbolized the death of nature, the falling of leaves, and the first sadness of frost. Here, then, is the explanation of why in China the color of mourning is not black, but the white of the sad, autumnal White Tiger.

Articles and photos for *The Refractor* are encouraged. Deadline for the June issue is May 15, 1996. Items may be submitted by mail to the editor, Ellis Myers, 215 Calle La Mesa, Moraga, CA 94556. Files on disk should be ASCII PC format, 3.5-inch 1.4M. Internet e-mail address is emyers@a.crl.com. For further information please call (510) 284-4103. Note the e-mail address has changed.

There are only nine naked-eye stars in Aries of magnitude 5 or brighter. The constellation is readily found by looking west from the Pleiades. The lucida–the brightest star in a constellation–is magnitude 2.2 Hamal. This star, α-Arietis, together with β and γ, identifies the triangular head of the proverbial ram. Another triangle of stars, comprised of 35, 39 and 41 Arietis, was once known as the asterism Musca Borealis, the Northern Fly, which hovered over the ram's rump. However, this fly was swatted in the 1800s, and the one celestial fly remaining is the constellation Musca in the Southern Hemisphere.

In the 1980s, Aries was in the news as the location of the "Aries Flasher", an ephemeral and peculiar object observed by several amateur astronomers, appearing as a bright flash lasting from one to three seconds in duration. It could not be identified as an astronomical object, because nothing known had a similar brightness or period. The object was finally determined to be a reflection off an artificial satellite. Some satellites with apogees on the order of 700 miles altitude move so slowly that they appear almost motionless for a few minutes.

Of several deep-sky objects located in Aries, NGC 772 is the best for smaller telescopes. It is a spiral galaxy seen in about three-quarters view. It measures about 5 by 7 arcminutes and is about magnitude eleven. The accompanying photo is part of the Space Telescope Science Institute's Digitized Sky Survey, and is from the National Geographic Society–Palomar Observatory Sky Atlas.

Many beautiful double stars are found in Aries. Mesarthim, γ-Arietis, is a pair of blue-white stars of equal 4.8 magnitude, separated by 8 arcseconds. This was the first double star to be so identified. The keen and versatile, yet controversial, scientist and astronomer Robert Hooke was following a comet in 1664 when he noticed this fine double star in his telescope's field of view. The two stars are aligned exactly north-south in the sky.

Ashley McDermott

will share his experiences during his recent visits to astronomical and space exploration sites around the country as the keynote speaker at the 28th Annual Riverside Telescope Makers Conference. The main theme of this year's program is *Getting Started in Astronomy–Expanding Your Astronomical Universe*. McDermott is Professor of Astronomy and History at the College of the Desert, and he is one of the organizers of the RTMC. He is well-qualified to lead the Conference in its goal of stimulating interest in astronomy and telescope building. At the meeting, which will be held May 24th through the 27th at Camp Oakes in the San Bernardino mountains, there will be many talks and demonstrations and workshops, as well as the opportunity to meet with experts in telescope making, observing, and other aspects of astronomy. The location, 50 miles northeast of Riverside at an elevation of 7300 feet, is ideal for this popular opportunity to view from dark, nonpolluted skies, and to hobnob with peers—even to enter your telescope into competition for Merit Awards for craftsmanship or design.

For a second year, participants at RTMC will be able to observe remotely with the Mount Wilson Institute 24-inch telescope. This ST6-CCD equipped instrument will deliver images to a computer at the Camp Oakes site, where image processing software will be available. Bring your disks and you will be able to take your photos with you.

For further information and registration materials, please call and leave a message at (909) 948-2205.

A New List

of astronomy-related items for sale supersedes the one given in the March issue of *The Refractor* and includes some choice items at fair prices. Again, these mint-condition optical accessories and books represent a unique opportunity for you to increase the efficiency of your observatory or to extend your library. Please call Mrs. Robert C. Johnson at (510) 482-3996 for more information. She has more things available which we do not have space to itemize here.

Replogle lunar globe	$25.00
Meade refractor 4-in. short focus f/6 telescope	600.00
13 assorted eyepieces and filters	2080.00
Plössl 55-mm eyepiece	125.00
Celestial micro-charts, $10 each	4/35.00
Burnham, *Celestial Handbook*, 3 volumes	28.85
Illingworth, *Dictionary of Astronomy*	19.95
Sidgwick, *Amateur Astronomers Handbook*	6.95
Planetarium Educators Workshop Guide	10.00
Mayall, *Celestial Objects for Common Telescopes*	6.00
Wil Tirion, *Sky Atlas 2000.0*	75.00
Olympus miscellaneous lenses	200.00

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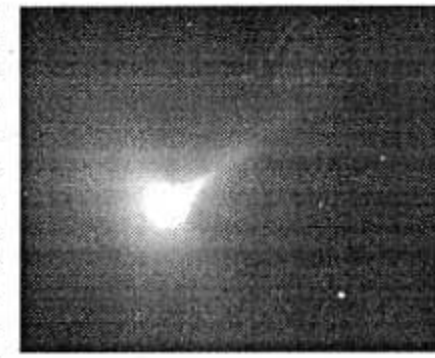
Roberts Rules

The past month has been one of considerable activity for EAS members, and I want to thank all those whose special efforts helped us to let the public know that comets are our friends–and not the bringers of danger and ominous foreboding. Chabot Observatory held a full week of public programs during the week when Comet Hyakutake was at its most glorious. These people were most helpful: Philip Crabbe, Debbie Dyke, Alan Fisher, Jerry Fisher, Greg Herlein, Conrad Jung, Rodger Mayeda, Ellis Myers, Lance Shaw, Louise Predovic, Jack Preston, Alan Roche, Dave Rodrigues and Norm Sperling. Robert Ashford of the San Jose Astronomical Association loaned us his 5-inch f/6 Starfire refractor, and we are most appreciative.

Then again, on Astronomy Day, April 20, Phil, Debbie, Alan, Alan, and Norm from the above list returned for another evening, manning the telescopes and answering questions. George Roush, Mike Reynolds, and Mike Martinez also were indispensible; and Conrad Jung and Mark Thein both brought their 'scopes for observing from the area in front of the Observatory. Don Stone kept the gift shop humming with activity. The weather cooperated nicely for views of Venus, the crescent Moon, M3, and other objects; and all had a good time meeting and talking with the more than 50 visitors.

The next outreach event where *you* can help will be on May 21, when we will present a program at Fairview School in Hayward in cooperation with Project Astro. Please see me if you can participate in this worthwhile educational adventure. Also, keep in mind the upcoming Festival at the Lake, June 7-9. We'll need a number of volunteers to make this event a success.

I was fortunate to be able to photograph Comet Hyakutake from the dark sky at Fremont Peak on March 26 with a 200-mm lens, shown on page 1 of this issue. On the same day, Debbie Dyke captured a beautiful picture of the head of the comet with Rachel, Chabot's famous 20-inch refractor. Her 30-second exposure shows a great deal of structure in both the head of the comet and in a jet that lies in the direction of the tail. She used full aperture, unguided, with C-14 telecompression to f/10, on Kodak Pro 400 film. Ask to see this lovely photograph in color—it is really nicely done.



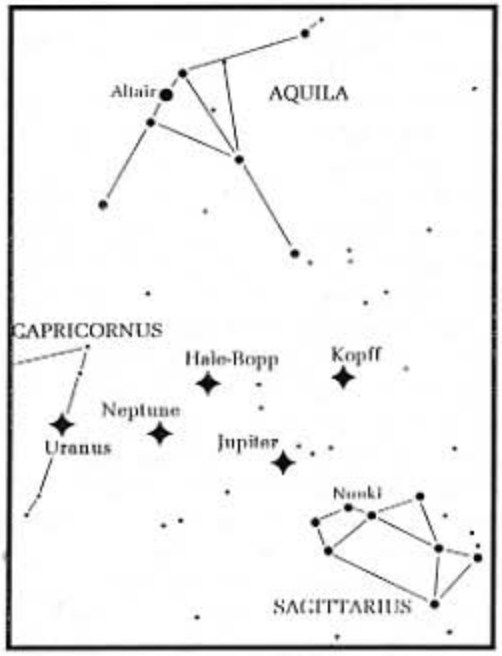
The Chabot Observatory and Science Center Board is expected to announce shortly the rescheduling of the groundbreaking ceremonies for the new facilities in Joaquin Miller Park. This will most likely be in October.

Kingsley Wightman has become weaker with another stroke. He would welcome your cards, addressed to Hy-lond Convalescent Hospital, 3408 E. Shields Avenue, Fresno, CA 93726. We trust that he will gain strength and be well enough to attend the Chabot groundbreaking this fall.

Carter Roberts

The Solar System

is putting on a show this month, presenting a number of its members in seldom-seen performances. Of course, the recent appearance of Comet Hyakutake 1996 B2 is a hard act to follow, but if you get there early (in the morning) you will be in for a treat. Unable to compete with the record-breaking performance of Venus in the evening sky, Jupiter comes on after midnight to put on its late show. Along with the great planet will be a host of accompanists, including Neptune and Uranus, and featuring two newcomers, Hale-Bopp and Kopff. All of these will be performing this month in the triangle between Sagittarius, Aquila and Capricornus.



First, however, let us consider the principal performance, that of Venus, the true Evening Star. On Saturday, May 4, Venus will shine at its brightest for the year at magnitude –4.5. The apparent disk of the planet continues to increase in diameter as Venus heads to its nearest approach to the Earth on June 10. It is possible that during the last week of May, keen-eyed observers may be able to detect the slim crescent shape of the planet with the naked eye. And on Sunday, May 5, the planet reaches the highest altitude of any time in the 1900s, which for our latitude will be 80° above the horizon as it crosses the meridian about 4 p.m. PDT. It will be situated very near to the Pleiades, something like 40° altitude at dusk. Interesting experiments you might try, connected to this close encounter with Venus, would be to try locating the planet during daylight hours. Also, go to a dark site at mid-month (New Moon is on May 17) and see if you can see shadows cast by the brilliant orb.

In the mid-May morning sky, Mercury and Mars will be just 5° apart in the east. Saturn, too, is in the morning sky. None of these three, however, will be high enough for good viewing this month.

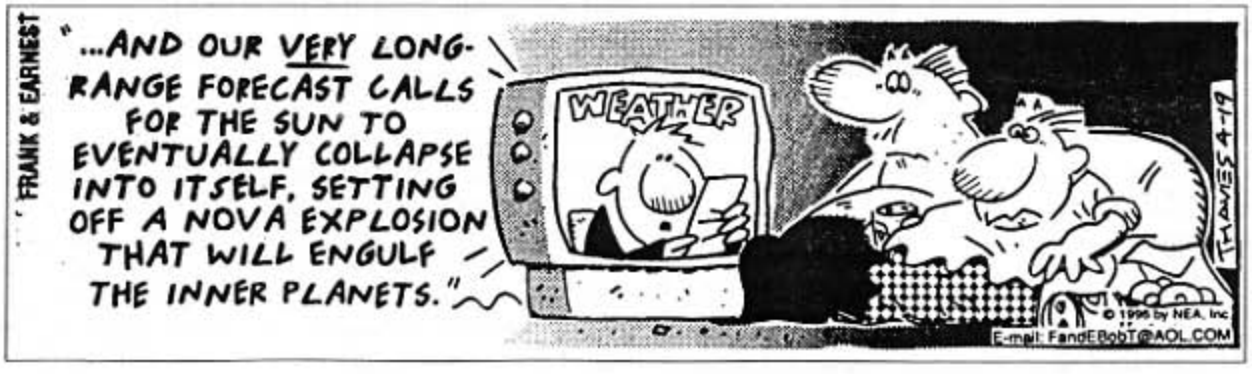
May is a good time this year for observing Pluto. It rises at sunset to cross the meridian at midnight as the planet reaches opposition on May 22. It is against the stars of Ophiuchus. At magnitude 13.7, it will require dark skies and at least 8 inches of aperture for identification.

Two minor members of the Solar System are also good objects for observation now and into summer. Vesta will be at opposition on May 11 and is expected to be as bright as magnitude 5.6, possible for naked-eye viewing under good seeing conditions. Look for it just above the star Zubeneschamali, which is β-Librae. Vesta, the fourth asteroid discovered, is the brightest of these minor planets and the only one that ever becomes visible to the naked eye. But Ceres, the largest of the asteroids, will be at magnitude 7 at its opposition on May 29.

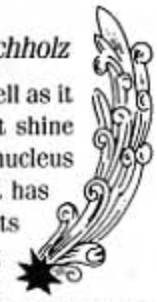
Another Planet

has been discovered and announced by Geoffrey Marcy of San Francisco State University and Paul Butler of the University of California at Berkeley. These same researchers earlier reported planets outside our solar system in Ursa Major and Virgo, as well as confirming one in Pegasus. The team is undertaking a survey of 120 Sun-like stars, and spectroscopic observations enable the astronomers to determine the radial velocity as a function of time. The cyclical nature of these readings for a magnitude 5.3 star in the constellation Cancer reveals the existence of an object circling the star with a period of 14¾ days.

The data obtained by Butler and Marcy suggest that the newly discovered planet has a mass not more than 80% that of Jupiter. It orbits its parent star at a distance of 16½ million kilometers, less than a third the average distance between Mercury and the Sun. These parameters point to a temperature at the surface of the planet of about 500 degrees Celsius. The star system, 55 Cancri (also designated HR 3522), is positioned at R.A. 8h52.6m, Dec. +28.3°.



Comet Comments *By Don Machholz*



Comet Hyakutake (C/1996 B2) performed well as it passed by Earth in late March. Not only did it shine brightly, but bits of material were blown off the nucleus while the tail stretched for over 70 degrees. It has been a most memorable comet! It will reach its closest point to the Sun on May 1 then becoming an exclusively Southern Hemisphere object, with two possible exceptions. First, it may be visible in daylight through a telescope to experienced observers who take the proper precautions to avoid pointing their instrument at the Sun. Secondly, the comet's tail msy be seen at morning twilight between roughly April 28 and May 7. A long tail will point toward the northern part of the constellation Triangulum on April 28, swinging southward during the next week until it points toward the planet Saturn (due east) by May 7.

Comet Hale-Bopp passes behind the Moon on the morning of May 8. This rare lunar occultation will be visible at roughly 09hr UT from the western United States, Mexico and Central America. Meanwhile, several other comets are visible, including faint Comet Chiron, which has just reached perihelion in its 50-year orbit. It will appear quite small since it is 7 AU away.

C/1996 E1 (NEAT): This comet was discovered at magnitude 16 on March 15 by the Near Earth Asteroid Tracking Team. It reaches perihelion in July at 1.35 AU. It may brighten to magnitude 14 by then.

Date (00UT)	R.A. (2000)	Dec.	Elong.	Sky	Mag.
C/1995 Y1 (Hyakutake) [Pegasus-Andromeda]					
04-27	22h51.1m	+32°47'	51°	M	10.5
05-02	23h02.5m	+33°35'	52°	M	10.7
05-07	23h13.1m	+34°18'	53°	M	10.9
05-12	23h22.8m	+34°57'	54°	M	11.1
05-17	23h31.6m	+35°33'	56°	M	11.3
05-22	23h39.7m	+36°05'	58°	M	11.5
05-27	23h47.0m	+36°34'	60°	M	11.7
06-01	23h53.6m	+37°00'	62°	M	11.8
C/1996 B1 (Szczepanski) [Hydra]					
04-27	09h22.3m	-16°31'	109°	E	10.6
05-02	09h24.5m	-17°59'	106°	E	10.8
05-07	09h27.5m	-19°19'	102°	E	11.1
05-12	09h31.0m	-20°32'	100°	E	11.3
05-17	09h35.1m	-21°39'	97°	E	11.5
05-22	09h39.7m	-22°43'	94°	E	11.8
05-27	09h44.6m	-23°43'	92°	E	12.0
06-01	09h49.9m	-24°42'	89°	E	12.2
C/1995 O1 (Hale-Bopp) [Sagittarius]					
04-27	19h44.7m	-17°40'	102°	M	7.8
05-02	19h43.8m	-17°16'	107°	M	7.7
05-07	19h42.6m	-16°52'	112°	M	7.5
05-12	19h40.8m	-16°28'	117°	M	7.4
05-17	19h38.6m	-16°03'	123°	M	7.3
05-22	19h35.8m	-15°37'	128°	M	7.2
05-27	19h32.5m	-15°11'	133°	M	7.1
06-01	19h28.6m	-14°44'	139°	M	6.9
C/1996 B2 (Hyakutake) [Aries-Eridanus]					
04-27	02h37.0m	+27°59'	15°	E	0.1
05-02	02h25.9m	+20°52'	06°	E	-0.3
05-07	02h21.7m	+12°19'	10°	M	0.8
05-12	02h24.8m	+04°33'	19°	M	2.2
05-17	02h31.9m	-02°29'	27°	M	3.3
05-22	02h41.5m	-09°12'	35°	M	4.1
05-27	02h53.2m	-15°47'	42°	M	4.8
06-01	03h06.7m	-22°21'	50°	M	5.3
22P/Kopff [Sagittarius]					
04-27	18h21.5m	-16°19'	122°	M	9.0
05-02	18h29.5m	-16°10'	125°	M	8.7
05-07	18h37.2m	-16°02'	127°	M	8.5
05-12	18h44.3m	-15°55'	131°	M	8.3
05-17	18h51.0m	-15°49'	134°	M	8.1
05-22	18h57.2m	-15°46'	137°	M	7.9
05-27	19h02.4m	-15°46'	140°	M	7.7
06-01	19h07.2m	-15°51'	144°	M	7.5
95P/Chiron [Virgo]					
04-27	12h30.5m	-05°46'	152°	E	15.5
05-02	12h29.5m	-05°36'	147°	E	15.5
05-07	12h28.5m	-05°27'	142°	E	15.5
05-12	12h27.8m	-05°20'	137°	E	15.5
05-17	12h27.1m	-05°13'	132°	E	15.5
05-22	12h26.6m	-05°06'	127°	E	15.5
05-27	12h26.3m	-05°01'	122°	E	15.6
06-01	12h26.2m	-04°57'	117°	E	15.6

Elements for C/1995 Y1 (Hyakutake):
Perihelion: 1.064576AU [199602/24.28973]; Arg.(2000): 056.35126°
Ascending node (2000): 195.75924° Eccentricity: 1.0
Inclination (2000): 064.46584° Orbital period: Long period

Elements for C/1996 B2 (Hyakutake):
Perihelion: 0.23014060 AU [1996 06/01.40406]; Arg. (2000): 130.18992°
Ascending node (2000): 188.06114° Eccentricity: 0.9998449
Inclination (2000): 124.90012° Orbital period: 57000 years

Elements for C/1995 Y1 (Szczepanski):
Perihelion: 1.4486192AU [1996 02/06.89904]; Arg. (2000): 151.27225°
Ascending node (2000): 345.44413° Eccentricity: 0.9899357
Inclination (2000): 061.90616° Orbital period: 1727 years

Elements for C/1995 O1 (Hale-Bopp):
Perihelion: 0.9140971 AU [1997 05/01.14561]; Arg. (2000): 130.59227°
Ascending node (2000): 282.47087° Eccentricity: 0.9950784
Inclination (2000): 089.42807° Orbital period: 3000 years

Elements for 22P (Kopff):
Perihelion: 1.5795617 AU [1996 07/02.19980]; Arg. (2000): 162.83487°
Ascending node (2000): 120.91329° Eccentricity: 0.5440739
Inclination (2000): 005.72143° Orbital period: 6.45 years

Elements for 95P (Chiron):
Perihelion: 1.5795617 AU [1996 02/14.95655]; Arg. (2000): 339.56390°
Ascending node (2000): 209.38406° Eccentricity: 0.3828750
Inclination (2000): 006.93051° Orbital period: 50.70 years

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
3	1996	Full Moon, 04:48 PDT = 11:48 UT
4	1996	Venus at greatest brilliancy, magnitude -4.5
8	1996	Moon occults Comet Hale-Bopp, 02:08 PDT
9	1996	Last Quarter Moon, 22:04 PDT = 05:04 UT May 10
17	1996	New Moon, 04:46 PDT = 11:46 UT
22	1996	Pluto at opposition, 07:00 PDT
25	1996	First Quarter Moon, 07:13 PDT = 14:13 UT

UPCOMING EVENTS

4 May. Astronomical Auction. San Jose.

4 May. EAS meeting.
Don Machholz. Comet Fever

11 May. NCHALADA. Chabot.

21 May. Outreach event at Fairview School.

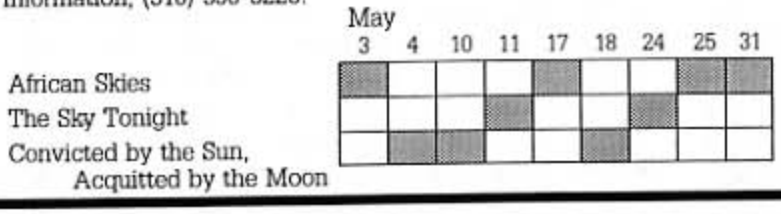
24-26 May. Riverside Telescope Makers Conference. Big Bear.

7-9 June. Festival at the Lake.

22-23 June. Astronomical Society of the Pacific. Universe '96. Santa Clara.

10 August. Fremont Peak Star-B-Que.

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



The next meeting of
NCHALADA
Saturday, 11 May, 9:30 a.m.-5:00 p.m.
at Chabot Observatory

The Aether and Its Many Uses
—
Observatories as Planned and Built

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