San Francisco Amateur Astronomers

The Randall Museum
199 Museum Way, San Francisco, CA 94114

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BULLETIN FOR APRIL 1991

Date: WEDNESDAY, APRIL 17

Time: 8:00 PM

Place: THE RANDALL MUSEUM

Speaker: DR. ALEX FILIPPENKO
Dept. of Astronomy
UC Berkeley

Topic: THE LATEST FROM THE HUBBLE SPACE TELESCOPE

WHAT'S INSIDE

GET READY FOR THE SOLAR ECLIPSE !

On Saturday, April 6, at 8:00 p.m., Carter Roberts will present a free public lecture, "The Great 1991 Total Solar Eclipse - How to View and Photograph It", at Chabot Science Center, 4917 Mountain Boulevard, in Oakland. Carter is President of the Eastbay Astronomical Society, a veteran of ten eclipse expeditions and an expert astrophotographer. He'll tell us what to expect and share his personal tips for successfully photographing the event. This is your chance to get answers to all your eclipse questions!

NEXT SFAA STAR PARTY APRIL 13

The club's next scheduled star party at Rock Springs on Mount Tamalpais is Saturday evening, April 13, beginning at dusk. The rain is great, but it certainly has played havoc with our star parties the last few months. Here's hoping the weather will clear just long enough for the New Moon weekend! Call the star party hotline (468-3592) Saturday afternoon before you leave home to avoid a possible wasted trip up the mountain.

ASTRONOMY DAY

The 19th annual Astronomy Day will be held on Saturday, April 20. Founded locally in 1973, the event has now spread around the world. The SFAA will be setting up telescopes and handing out flyers at two locations in the City this year.

Bill Cherrington will be at the Cliff House from 10:00 a.m. to 2:00 p.m. with his sunscope and return there from 6:00 to 10:00 p.m. to show the public the Moon and planets. Bob Levenson will be setting up at Aquatic Park from 11:00 a.m. to 3:00 p.m. for solar viewing. If you can help out for a few hours at either site, please call Bill at 752-9420 or Bob at 468-3592.

BULLETIN CONTRIBUTIONS

The SFAA Bulletin is a forum in which club members may share their ideas and experiences in astronomy. We encourage you to participate and welcome your letters, sketches and articles on astronomical topics. Please send your contributions to the SFAA Bulletin, C/O Jim Shields, 190 Chilton Avenue, San Francisco 94131. Deadline is the 18th of the month.

SFAA MEMBERSHIP BENEFITS

The club offers three categories of membership, with annual dues as follows:

Regular Membership - $20
Family Membership - $25
Junior Membership - $ 5 (for astronomers under 18)

SFAA members receive the monthly Bulletin and free admission to club activities including monthly lecture meetings and star parties, field trips and the annual picnic. In addition, they may subscribe to several astronomy magazines at greatly-reduced rates. For more information, contact Chelle Beard, 32 Penhurst Avenue, Daly City 94015. Telephone 878-4965 evenings.

OBSERVING THE HUBBLE SPACE TELESCOPE - by Jeff Felton

Artificial satellites in low earth orbit are often visible to the naked eye. They resemble stars, except that they show perceptible motion, crossing the entire sky in just 5 to 10 minutes. Some, for example the Soviet space station Mir, may be very bright, first magnitude or brighter. Their visibility is confined to those times when they pass overhead while the sky is dark but the satellite is illuminated by the rays of the sun and thus does not lie within the earth's shadow. These times are before dawn and after sunset. Near-earth satellites are not visible in the middle of the night.

The altitude of such satellites is a few hundred kilometers, and consequently the region from within which they can be seen at a given moment is a circle with a radius of perhaps 2000 km. So a satellite that is visible in San Francisco may not be visible in New York at the same time. As the satellite revolves in its orbit, the earth rotates on its axis beneath the satellite. So on successive orbits the satellite will pass over different locations on the earth's surface. The orbital periods of near-earth satellites range from 88 minutes to about 125 minutes.

The parameters which define the orbit of a satellite with respect to the earth and its rotation are called the **orbital elements** of that satellite. They can be used to predict the times when a particular satellite will pass sufficiently close to a given terrestrial location to be visible from that location. Because satellites in low earth orbit interact with the very thin upper atmosphere they experience drag. This causes them to lose energy so that their orbital elements change with time.

Old orbital elements which have become inaccurate due to the above cause are sometimes referred to as "stale". Naturally, as a set of orbital elements becomes increasingly "stale", their ability to be used in generating accurate predictions of the passage of a satellite is greatly reduced. For this reason the orbital elements for a given satellite must be periodically updated. Current orbital elements of thousands of artificial satellites are maintained by the US Space Command and are made available through NASA for educational and scientific purposes. I periodically receive updated orbital elements for about 20 satellites from NASA.

To predict satellite appearances, I use a computer program, Space Birds-AT, written for the IBM-PC by Roger Mansfield, Astronomical Data Service, 3922 Leisure Lane, Colorado Springs, CO 80917, which I purchased from Sky Publishing Corporation. To run Space Birds-AT, one must input the current orbital elements of the desired satellite, the observer's location, and the date. The program will then identify all visible passes of the satellite for that date. The typical output of this computer program for a given satellite pass is in the form of a series of about five time points, at one-minute intervals. To define the position of the satellite in the sky at each time point there are two corresponding

(Continued on page nine)

The January SFAA Star Party
or
On The Virtue of Patience

by Tom Kellogg

The sunset filled the sky with deep reds, turquoise, purple & a myriad of wild colors, not really what we'd hoped for. Bill Charrington & Ray Cash-LePennec were the only other SFAA's who'd arrived yet. I felt disappointed with the cloud cover since this was the first time my wife, Jeanne, had come with me. Irving Hochman and his cousin David arrived before dark and Irving concurred with Bill's optimism that it would probably clear up. I didn't feel hopeful but the slow trickle of members' arrivals seemed to boost my hopefulness simply by the number of people who felt optimistic enough to drive all the way up to the Rock Springs parking lot. Jeanne & I had arrived in the morning and enjoyed a long day hike under clear skies and toasty sunshine.

By 8 PM around 20 cars had arrived but the sky remained cloudy. I got to know David while Jeanne retreated to our car for warmth. David is an art student and his bubbly enthusiasm was contagious. He's been a star-gazer for 3 years and just recently he got a 6" newtonian reflector. He'd seen the planets and our moon from San Francisco but this night was the time he'd been longing for in hopes to see nebulae and galaxies. At this point I knew that I was speaking with a fellow explorer, a kindred spirit, another star struck galaxy hunter.

Within a few minute span the heavenly vault suddenly opened its doors with the dispersion of the blanket of clouds. Telescopes were pulled out and set up and the heavenly feast began. With Andromeda nearly at the zenith I directed David to his first view of our next door neighbors, an awesome 2.2 million light years away. Then I took a long shot and instructed him how to find M81 & M82. The asterism in Ursa Major called the big dipper has been named in order starting with the end star of the dipper. The names are the first 7 letters of the greek alphabet, α, β, γ, δ, ϵ, ζ, and η. To find M81 & M82 I told him to hold his hand up with a finger and thumb pointed to γ and α. Then carefully step that same distance from α along the same direction (NW). That's a tough pair to find but David found them almost as quickly as I did with my 11 × 80 binoculars.

The air was filled with many familiar voices and some unfamiliar voices of visitors, guests, or first time members. But one familiar voice, that I've heard at nearly every star party I've been to, was absent. Gordon Ridly with his masterful gift of story telling and giving the stars personalities. Gordon's style makes me think of Leslie Peltier's writing style in Starlight Nights. As usual I left early since I'm an early-to-bed early-to-rise type of person.

Jupiter in April

by Fred Sammartino

Jupiter reaches quadrature on April 25. If you're an optimist, that means the Jupiter is directly overhead at sunset, perfectly placed for observing in the early evening. If you're a pessimist, that means the Jupiter has already started its descent by the time its dark enough to get a good view! Quadrature is also the time when we get the most oblique view of the system of Jupiter and its moons. There is the greatest distance between the moons and their shadows. Ganymede and Callisto, the moons furthest from Jupiter, will pop back into sight after occultation, only to fade in eclipse in Jupiter's shadow. When they reappear again, they will be at a surprisingly large distance from the planet.

The highlite for this month is definitely the cloudtops. Jupiter's weather continues to be strange. Just when the southern equatorial belt was supposed to return to "normal", it has started to fade again! This time it appears to have "spread out" and has gotten much wider and more diffuse. At the same time, the northern belt appears darker and narrower than usual, with several large knots. Make sure to take a look to see any additional changes for yourself. The red spot is a bit challenging, but still visible on the southern edge of the southern belt. It will be visible for about an hour and a half before and after the times listed below. All times are PST before, and PDT on and after Sunday, April 7

Red Spot at central meridian

Tue, Apr 2, 11:15 PM	Fri, Apr 12, 10:33 PM	Mon, Apr 22, 8:52 PM
Fri, Apr 5, 12:54 AM	Mon, Apr 15, 12:12 AM	Wed, Apr 24,10:31 PM
Fri, Apr 5, 8:46 PM	Wed, Apr 17, 1:51 AM	Sat, Apr 27, 12:10 AM
Sun, Apr 7, 11:24 PM	Wed, Apr 17, 9:43 PM	Mon, Apr 29, 9:40 PM
Wed, Apr 10, 1:03 AM	Fri, Apr 19, 11:21 PM	Wed, May 1, 11:19 PM
Wed, Apr 10, 8:55 PM	Mon, Apr 22, 1:00 AM	

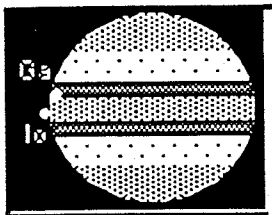
Here are times (PST) for moon close conjunctions visible in California. The moons will actually touch in the ones indicated by "*"

Moon Close Conjunctions

(Eu=Europa, Ga=Ganymede, Ca=Callisto)

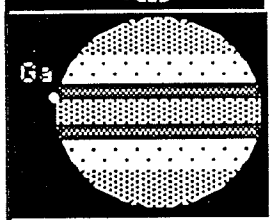
Io-Ca: Wed, Apr 3, 9:23 PM	Io-Ga: Sat, Apr 13, 12:14 AM
Io-Ga: Thu, Apr 4, 9:44 PM	Io-Eu: Sun, Apr 14, 1:01 AM *
Io-Ca: Thu, Apr 4, 10:07 PM	Io-Eu: Thu, Apr 18, 8:59 PM
Ga-Ca: Thu, Apr 4, 9:49 PM	Eu-Ca: Sun, Apr 21, 11:10 PM
Eu-Ga: Sat, Apr 6, 12:03 AM	Eu-Ga: Mon, Apr 22, 9:52 PM
Io-Eu: Sat, Apr 6, 9:47 PM *	Io-Eu: Thu, Apr 25, 11:12 PM
Io-Ga: Fri, Apr 12, 2:11 AM	Eu-Ga: Tue, Apr 30, 1:08 AM
Io-Ca: Fri, Apr 12, 1:51 AM	

Here are some of the more interesting moon configurations for April. Note the large moon-shadow distances. The red spot and moons move right to left in front of Jupiter and left to right behind Jupiter in these pictures. Moons not shown are out of the field of view. Times are PST or PDT.



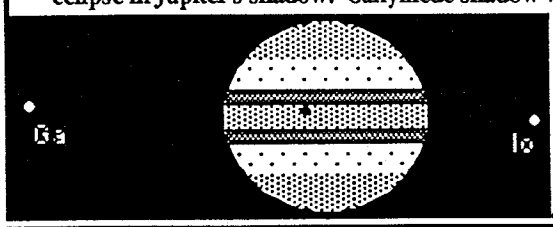
Monday, April 1 - "invisible" conjunction, no fooling!

8:03 PM - Ganymede, ending transit, may be visible floating above the dark limb of Jupiter. Io is ready to disappear in occultation behind Jupiter

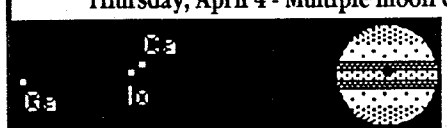


8:12 PM - Look quick! Only 9 minutes later Ganymede has fully emerged from transit. Io is invisible behind Jupiter.

11:31 PM - Io finally slowly reappears after occultation, then eclipse in Jupiter's shadow. Ganymede shadow was visible since 9:23 PM, and is now just past the central meridian of Jupiter.



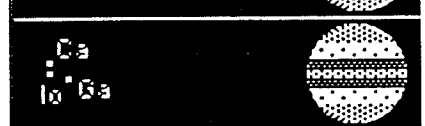
Thursday, April 4 - Multiple moon conjunctions



7:21 PM - Rare view of Callisto's shadow near central meridian. Europa invisible in occultation.

9:42 PM - Io above Ganymede. Europa still invisible, now in eclipse in Jupiter's shadow.

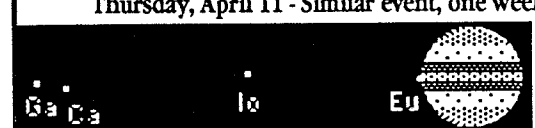
9:50 PM - Ganymede has moved to be directly below Callisto.



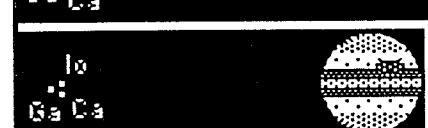
10:12 PM - Io has moved directly below Callisto. Europa still invisible.

10:58 PM - Europa finally slowly reappears.

Thursday, April 11 - Similar event, one week later



9:10 PM - Europa disappears in occultation



1:50 AM - Io, Ganymede & Callisto in tight triangle. Europa invisible in Jup's shadow. Red spot visible.

Saturday, April 20

9:45 PM - Europa exits transit, shadow visible on opposite side of planet since 9:24

11:58 PM - Callisto starts transit. Europa shadow still visible

APRIL LIST OF MESSIER OBJECTS by Dennis Tye

This is the third installment of the Messier list. This month there are nine objects listed - one open clusters and eight galaxies. Now we get to see if you did your homework in February with M32 and M110.

Most galaxies are not visible in a finder, so it is imperative that you know how to use your setting circles or star hop in order to find these objects. It helps if you know what to look for - that's why I had you pay close attention to M32 and M110 in February. Once you get familiar with the appearance of these galaxies you'll be ready to tackle the tougher ones yet to come.

NGC#	MES	RA	DEC	Mag	TYP	SIZE	DIST	CON	DESCRIP
2548	048	08 11.2	-05 38	05.3	OCL	030'	0950	HYA	

I considered this cluster to be one of the tougher ones. It's not very distinct and was once considered a "missing" Messier object. There are about 30 members in a fairly spread out field of 30'.

3031	081	09 51.5	+69 18	07.9	Sb	021'x9.8'	M26.5	UMA	

On to the galaxies. M81 is an easy one to start with. It's big and bright and easy to find, like M31. Some arm structure may be visible.

3034	082	09 51.9	+69 56	08.8	Pec	9.0'x4.0'	M26.5	UMA	Exploding

Close by M81, M82 is an irregular galaxy that's smaller and fainter. Look for the dark absorption bands through the middle.

4736	094	12 48.6	+41 23	07.9	Sbp	5.0'x3.5'	M28.2	CVN	

Another easy face on spiral galaxy, like a miniature M31. Photographs show a bright nucleus with tight arms and possibly a ring around the entire galaxy.

3623	065	11 16.3	+13 23	09.3	Sb	7.8'x1.5'	M28.9	LEO	

M65 and M66 lie 20 arc min apart and may be seen in the same field of view. Both are spiral galaxies seen as two bars of light without structure.

3627	066	11 17.6	+13 17	08.4	Sb	8.0'x2.5'	M28.9	LEO	

(see M65)

3351	095	10 41.3	+11 58	10.4	Sb	6.1'x3.5'	M29.1	LEO	

Another pair of galaxies, M95 and M96, lying close to each other and visible in the same field. Both are fairly faint and show no detail.

3368	096	10 44.2	+12 05	09.1	Sbp	5.0'x4.0'	M29.1	LEO	

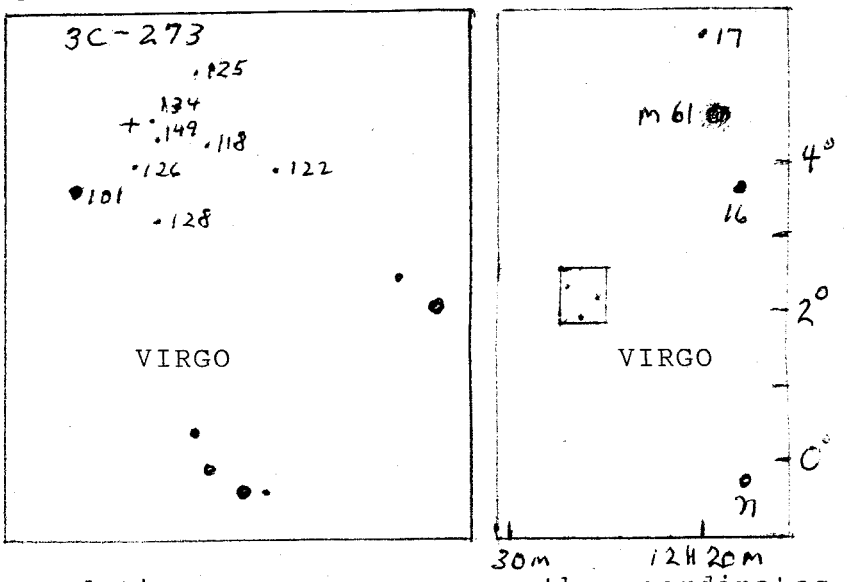
(see M95)

3379	105	10 45.2	+12 51	09.2	E1	2.2'x2.0'	M29.1	LEO	

A third member of a trio with M95 and M96. M105 lies just off the edge of the field with M95 & M96. It is a small elliptical, considered to be the smallest object in the Messier list. There are two other object in the same field as M105, NGC 3384, an elliptical galaxy, and NGC 3389, an irregular galaxy. I was able to spot NGC 3384 but was unable to see NGC 3389.

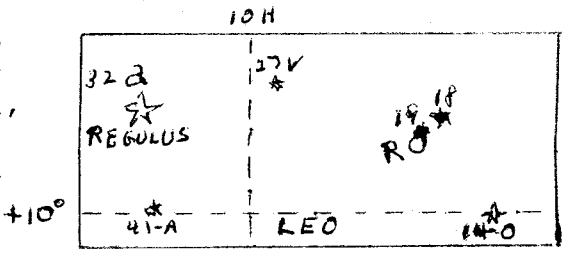
THE BRIGHTEST QUASAR IN THE SKY: 3C-273 -- by Gordon Ridley

Over the past several years you have probably read in the various astronomical magazines many times about quasars, what they are, where they are, and the problems they have posed for astronomers. But, have you ever actually seen one through a telescope? If not, here is your opportunity. 3C-273 is the brightest of all quasars and thus is visible to most small telescopes under dark skies. The next time you are at a star party on Mt. Tamalpais and the constellation Virgo is in the sky above, get out your Sky Atlas Chart 13 or 14, or Uranometria 2000 page 238 or 239, or, a chart of the Virgo area, and line your scope up on the coordinates 12H 29' 06.8" R.A. + 2° 03' 07" Dec. and look for this magnitude 12.86 object.Bright stars immediately to the west include Eta Vir (Mag. 3.9) and stars 16 Vir (Mag 5.0) and 17 Vir (Mag 6.5). With a red shift of 2=0.158 3C-273 is receding from us at a rate of 7,000 km/s and is probably 2 to 3 billion light years from Earth, making it, by far, the intrinsically-brightest, most-distant object that can be seen in a small telescope. Give it a search!



R LEONIS: A variable star worth watching.

Here is a rare and difficult object to look for with the naked eye. The star R Leonis, close by the paw of the lion, is a variable star that just surfaces the limit of naked eye visibility when it is at its brightest. Usually it must be seen with binoculars or a small telescope. R Leonis rises to about 5th magnitude at maximum and declines to 10th magnitude or fainter at minimum, with an average period of 312 days. The star is noted for the intensity of its red light, best described as "rosy" scarlet. Leslie C. Peltier began his notable variable star career with an observation of R Leonis on March 1, 1918. Look for this star on Sky Atlas 2000 Chart 13, or Uranometria 2000 Page 188, at 9H 47.6' R.A. + 11° 26' Dec. Of course, R Leonis might not be at its brightest when you are ready to look for it, so, follow it with binoculars or your telescope until that fateful day, at last, when you can capture it with your own unaided eye!



THE METEORIC DEMISE OF THE DINOSAURS: THE EVIDENCE GROWS

Joel W. Goodman

By now, almost everyone is familiar with the theory that the abrupt extinction of dinosaurs and a multitude of other life forms about 65 million years ago at the end of the Cretaceous Period was caused by the impact of an asteroid-like body about 10 km in diameter. This notion was originally proposed about ten years ago by Luis and Walter Alvarez, a father and son team at the University of California at Berkeley. The principal evidence supporting a cosmic calamity has been the unusually rich iridium content of a thin soil layer at the boundary between the Cretaceous and Tertiary (K/T) Periods, precisely when the mass extinctions took place. The abundance of iridium in that layer is about 20 times that normally found in terrestrial soils, and has been interpreted to mean that an extraterrestrial object of substantial mass impacted the earth at that time, leaving its globally distributed signature in the form of enriched iridium.

Despite the compelling attractions of the asteroid impact theory, opponents have argued that the high iridium content could have derived from the bowels of the earth during a period of unusual volcanic activity which caused the mass extinctions. These counter arguments, while perhaps less persuasive or aesthetically pleasing than the cosmic hypothesis, have been difficult to conclusively dispel and the controversy has persisted. The case for an impact can be likened to trying to prove the guilt of an accused murderer without witnesses or a "smoking gun": circumstantial evidence may be convincing by its cumulative force, but it is seldom air tight.

Now, new evidence pertaining to the extinction mechanism has not only strengthened the case for the impact hypothesis, but even suggests where the impact may have taken place. The new evidence has to do with the discovery of *tektites* at the K/T boundary in Haiti. Tektites are small, glassy objects originating from the fusion of minerals at high temperatures and pressures. They are usually rich in silicon dioxide, but contain other compounds as well, which impart color to the crystalline material. The important point is that glassy objects of this kind are naturally formed as consequences of cataclysmic events, such as volcanic eruptions or major impacts. A critical distinction between volcanic and impact glass is that the former has large quantities of trapped gas because volcanic eruptions are gas-driven. The tektites from the K/T boundary have little, if any, trapped gas. This characteristic is a telling argument in favor of an extraterrestrial source. Moreover, the Caribbean region is the only area where tell-tale tektites dating precisely from the K/T boundary have been found. This permits a narrowing of the search for the impact crater that must have resulted from the catastrophe.

The most promising candidate thus far for the K/T impact site appears to be a very large (180 km diameter) crater known as Chicxulub in the northern Yucatan region of Mexico. The area around this crater also contains "shocked" glass granules which, though different from the Haitian tektites, lend credence to the idea that the crater resulted from a titanic impact. Gravity and magnetic anomalies at Chicxulub, which had previously been attributed to buried volcanic lava flows, could conceivably be due to meteorite (and terrestrial) material melted down by the impact. Finally, modelling by scientists at the University of Arizona indicates that the Haitian and Yucatan tektites could have originated from a single impact.

While the evidence for the impact location is far from conclusive, the tektites provide the eagerly sought after "smoking gun" for the script, tipping the scales even more in favor of impact theory.

spatial coordinates (right ascension [R.A.] and declination). These indicate the satellite's **apparent** position to that observer.

To observe the satellite, I then plot each time point on a north polar projection map of the sky and connect the points with straight lines. Then I use a planisphere to determine what portion of the sky is visible at that time, and I draw an ellipse on my star map to delineate that portion. I arrive at my observing site several minutes before the predicted time to allow my eyes to dark adapt a little and to orient myself to the stars in the region of the sky through which the satellite will pass.

Typically, when I first spot the satellite it is faint, perhaps 4th magnitude, but as it ascends toward its highest elevation it brightens to first or second magnitude and then it dims again during the second half of its pass as it descends and then finally disappears. Binoculars are useful for viewing this final stage when it becomes too dim to see with the naked eye (and perhaps also for initially spotting the satellite). Interestingly, as it becomes very dim it sometimes also reddens significantly. The reason for this is that the satellite is experiencing a sunset at its high altitude, and is illuminated by the rays of the setting sun which are reddened as they pass through the earth's atmosphere.

I have used the "current" orbital elements for the Hubble Space Telescope (HST) to make predictions for visible passes of this satellite. Space Birds-AT predicts a series of pre-dawn passes of HST from Apr. 1 to Apr. 14, followed by a period of 5 days, from Apr. 15 to Apr. 19, during which there are no **acquisitions** (potential sightings) of HST. Then, from Apr. 20 to Apr. 30 there is an eleven-day series of early evening acquisitions of HST, followed by a period of no acquisitions from May 1 to at least May 9.

Below I provide some predictions which I hope will enable viewers to observe HST during its Apr. 20-Apr. 30 series of evening passes (weather permitting). Because of the publication schedule of the SFAA Bulletin I am running these predictions on my computer on Mar. 18, and the "freshest" orbital elements I have for HST date from epoch Mar. 2, 1991. So the HST orbital elements will be somewhat "stale" (at least seven weeks old) by the dates of the predicted appearances. In my experience, orbital elements of this age work reasonably well for predictions. The path that the satellite follows across the sky is essentially the same as predicted, although the actual time of the passage may be shifted earlier (as much as perhaps 7 minutes) than the predicted time. I have used my location near Kezar Stadium in San Francisco for making the predictions, but they should be satisfactory for any location within a 50 mile radius of that site.

The orbital inclination of HST (with respect to the earth's equator) is only 28.5° and its apogee is 610 km. From the latitude of San Francisco the maximum elevation it can reach above the southern horizon is about 26°. It never passes directly overhead.

In all apparitions seen from San Francisco HST will traverse low in the southern sky from west to east in a fairly flat arc with its highest point in the south, and will be visible for a maximum of about 7 minutes.

Data for the Apr. 20-Apr. 30 evening passes of HST are given in abbreviated form as follows: date, maximum elevation (deg), start time, length of pass (min), coordinates of the point of first visibility (R.A. in hours, declination in degrees), and coordinates of the point of maximum elevation (R.A. in hours, dec in degrees).

Apr. 20th, 12.8°, 8:26 PM PDT, 4 min / 8.9 h, -41° / 11.1 h, -35°
Apr. 21st, 17.4°, 8:37 PM PDT, 5 min / 8.0 h, -37° / 10.4 h, -34°
Apr. 22nd, 21.5°, 8:48 PM PDT, 5 min / 7.3 h, -31° / 9.6 h, -31°
Apr. 23rd, 24.4°, 8:59 PM PDT, 5 min / 6.7 h, -24° / 10.2 h, -28°
Apr. 24th, 25.3°, 9:10 PM PDT, 5 min / 6.3 h, -20° / 9.4 h, -27°
Apr. 25th, 24.0°, 9:22 PM PDT, 3 min / 6.8 h, -19° / 8.8 h, -25°
Apr. 26th, 20.8°, 9:33 PM PDT, 4 min / 6.6 h, -17° / 9.5 h, -29°
Apr. 27th, 16.6°, 9:45 PM PDT, 3 min / 7.1 h, -20° / 9.0 h, -30°
Apr. 28th, 11.9°, 9:58 PM PDT, 1 min / 8.6 h, -31° / 8.6 h, -31°
Apr. 29th, none
Apr. 30th, 14.5°, 8:38 PM PDT, 5 min / 7.0 h, -27° / 9.1 h, -37°

These 10 passes will travel along part or all of the same arc, which lies roughly along the -30° parallel of declination and extends from about 6.5 h to 12.5 h of R.A. This path begins in Canis Major; it crosses south of Hydra through Puppis, Pyxis, and Antlia, a region devoid of bright stars; it then goes through extreme southern Hydra and ends near Corvus. The best passes will be those with the highest elevation and the longest time, namely Apr. 22, 23, 24, 25, and 26, provided the sky is clear on those evenings. One possible source of difficulty during this time period is that the moon will be between First Quarter (Apr.21) and Full (Apr. 28). This may interfere with the visibility of HST if it passes near the moon. For all 10 passes, the point of maximum elevation (and best visibility) occurs in the Pyxis-Antlia region (R.A. 8.6 h to 11.1 h, declination -25° to -37°). The brightest star in either of these two constellations is only magnitude 3.7. So it should not be difficult to spot HST as it crosses this area; it will be the brightest object in the vicinity and will be moving.

Please note that the switch from Standard Time to Daylight Saving Time occurs on Sunday, April 7 and I have allowed for that in my predictions. In attempting to observe HST, choose a viewing site with a relatively unobstructed southern horizon and arrive there at least several minutes earlier than the predicted time, with your sky map, a wristwatch, and a red flashlight. Also, remember that due to the "staleness" of the orbital elements, HST may arrive anywhere from 1 minute late to several minutes early. If you have any questions, feel free to phone me at (415) 564-7082. If you wish to learn more about observing near-earth satellites, you can read Sky & Telescope May 1986, pages 457-463 and 501-502, or contact Roger Mansfield at the address given above.

COMET COMMENTS - by Don Machholz

Comet activity has been high lately, even Halley's Comet has participated by outbursting to magnitude 21, a jump of perhaps three magnitudes. Meanwhile, Comet 1991f is the 22nd comet find for Carolyn Shoemaker. She surpasses William Brooks and moves into second place (behind Pons who had 26) for the number of named comets. All of the Shoemaker finds, part of a program to find earth-crossing objects, were photographic and faint, most never reaching magnitude twelve.

Comet Shoemaker-Levy (1991d): Discovered on Jan. 22 at magnitude 15, this comet will be closest the sun late this year at 2.2 AU when it might reach magnitude 12.

Periodic Comet Shoemaker-Levy (1991e): This was picked up on Feb. 7 at magnitude 16.5. A preliminary orbit suggests that it was closest the sun at 2.9 AU last month with an orbital period of 7.3 years.

Periodic Comet Shoemaker-Levy (1991f): This was found Feb. 9 at magnitude 17. It takes 6.8 years to orbit the sun, and was at perihelion last July at 2.0 AU.

Comet McNaught-Russell (1991g): Robert McNaught found this comet on a plate taken Feb. 12 by Kenneth Russell in Australia. This comet was closet the sun at a distant 4.8 AU last October and remains faint.

Periodic Comet Takamizawa (1990h): Jim Scotti recovered this comet from Kitt Peak on Feb. 17. A strange comet which was discovered in 1984 after an outburst, it will be closest the sun on Aug. 17 at 1.6 AU. If it acts normal it will brighten to perhaps magnitude 15, but another outburst would make it quite a bit brighter.

Periodic Comet Kowal (1990i): Jim Scotti recovered this faint comet from Kitt Peak on Feb. 21. It orbits the sun every 15 years and is a full year away from perihelion, which is 4.7 AU. It will remain near magnitude 18.

EPHEMERIDES

DATE (UT)	RA (1950)	DEC	RA (2000)	DEC	ELONG	SKY	MAG
			Comet Levy (1990c)				
03-30	08h23.0m	+07°40'	08h25.7m	+07°30'	117°	E	10.1
04-04	08h19.6m	+09°21'	08h22.3m	+09°11'	112°	E	10.3
04-09	08h17.2m	+10°48'	08h19.9m	+10°39'	106°	E	10.5
04-14	08h15.8m	+12°03'	08h18.5m	+11°54'	100°	E	10.7
04-19	08h15.1m	+13°07'	08h17.9m	+12°58'	95°	E	10.9
04-24	08h15.1m	+14°02'	08h17.9m	+13°53'	90°	E	11.1
04-29	08h15.7m	+14°50'	08h18.5m	+14°41'	85°	E	11.3
05-04	08h16.8m	+15°31'	08h19.6m	+15°21'	80°	E	11.5
			Comet Metcalf-Brewington (1991a)				
03-30	03h47.7m	+09°48'	03h50.4m	+09°58'	49°	E	9.9
04-04	04h00.9m	+10°31'	04h03.6m	+10°39'	48°	E	10.0
04-09	04h14.0m	+11°09'	04h16.7m	+11°17'	46°	E	10.1
04-14	04h26.9m	+11°44'	04h29.7m	+11°51'	45°	E	10.2
04-19	04h39.8m	+12°15'	04h42.6m	+12°21'	43°	E	10.3
04-24	04h52.5m	+12°43'	04h55.3m	+12°48'	42°	E	10.4
04-29	05h05.1m	+13°06'	05h07.9m	+13°10'	40°	E	10.5
05-04	05h17.5m	+13°26'	05h20.3m	+13°29'	38°	E	10.6

San Francisco Amateur Astronomers
The Randall Museum
199 Museum Way, San Francisco 94114

CLASSIFIED ADS

Members' ads are free and will run three times. Please notify the Bulletin editor if an item is sold so the ad may be deleted. This service is provided monthly on a space-available basis.

FOR SALE - Thinning out my telescope collection....17.5" f/4.5 Coulter optics in a collapsible Serrurier-truss Dobsonian design--a stunning performer that will transport in a compact car and assemble in minutes. $1500. Also...10.5" f/8.3 Dobsonian hand-figured by J.D. A great planetary and deep-sky scope on an attractive (faux marble) mount. $650. 665-8639 Ray.

WANTED - Is anyone interested in a field trip to the White Mountains sometime around May 18-23? Also a possible extension over the weekend of May 24-26 to the Riverside Telescope Makers' Conference. Call Dennis Tye at 566-0587.

FOR SALE - Celestron Firstscope 80 with alt-az mount, slow motion controls, adjustable tripod and accessory tray, 26mm eyepiece and 2X Barlow. Paid $600; asking $400. Like New! Call Ted at 367-0570 or 691-2324.