

EPHEMERIS

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November, 1990

INTRODUCTORY ASTROPHOTOGRAPHY

Will be the subject of this month's General Meeting. Bob Fingerhut, an accomplished amateur astrophotographer will demonstrate planetary photography techniques. The Mars opposition this month will be a prime opportunity for all you astrophotographers out there to try your best.

STAR HUSTLER

Jack Horkheimer, Star Hustler - a 5 minute television program that runs on KTEH channel 54 on Sunday evening about 11:50 - an offbeat program, aimed at non-astronomers, that is both entertaining and informing as Jack teaches elementary astronomy and sky lore. Each lesson is keyed to what is visible in the sky: Bright planets, major constellations, etc. Tell your friends!

AUCTION

The Red Cross has advised us that, due to coming construction at the Post Office, the parking lot will be shrinking and so we will no longer be able to hold the Auction there. We need a site somewhat larger than the Red Cross, at which we can drive up to unload, has good access for the mobility-impaired and for those carrying telescopes, and is free or nearly so. In addition, easy access from a freeway is highly desired (i.e., easy to give directions). The preferred date is May 4, 1991.

NOVEMBER STARRY NIGHTS

- RICHARD STANTON

PAS DE DEUX - Set up on late Monday night, November 26 for wee Tuesday morning, November 27, when two of Jupiter's moons will put on a dazzling dance. At 26 minutes after midnight, Pacific Standard Time, Europa will begin it dance across the face of Ganymede. The occultation will last almost 12 minutes before Europa finally steps away from Ganymede. Jupiter will have been up for about two hours when this event occurs and should be a little over 30 degrees in altitude. Hopefully this will be enough to clear our murky horizons. Let's see, late Monday night, early Tuesday morning ... is it the flu season yet?

LUNAR OCCULTATION - Saturday evening, November 3rd, grab your binoculars and stroll outside to watch the near Full Moon play Roller Ball with the Pleiades. The show will begin around 7:40 p.m., Pacific Standard Time. You may send your money for tickets to me in care of the Editor. Pop corn available for a reasonable surcharge.

MARS - This is just a simple reminder that Mars will reach Opposition on November 27th and will be showing its maximum disc diameter for this observing season. *Sky & Telescope* and *Astronomy* are both running good articles on observing Mars in their October, November issues. Watch your skies and close your windows on Tuesday the 20th as Mars is at its closest approach to Earth.

METEOR PARTY - Don't forget that one of our annual Major Meteor Showers, the Leonids, will peak on Saturday night, November 17th, and a **NEW MOON NIGHT!** Not only is this the darkest Saturday

night for this month's deep sky observers it is a heck of an opportunity to get in an "organized" meteor observing group. With today's modern technology, the pencil, you no longer have to take your shoes off and count on your toes. How about it?

ASTRONOMY PROJECT - November is a wonderful month to launch an entirely new concept for an astronomical project. As we all know, this is the traditional month for the Turkey festival. Also known as Thanksgiving. Is there one among us or perhaps a group among us with the trail-blazer instinct to find a stellar asterism that resembles a Turkey? Wouldn't you be proud to display on your wall an **OFFICIAL Certificate of Discovery** naming a whole asterism after you? I can see it now. O'Blearys Turkey Asterism discovered on (blank date) by T.B. O'Bleary. Discovery authenticated by a Not Indubious Team of astronomical Specialists. This is stupendous idea! Why shucks, we could even call this the "Great Turkey Award." It is also a consequence of writing

METEOR NOTES

- JIM RICHARDSON

For meteor showers, November is best known for the meteor storms which have, occasionally in history, given us one of the most spectacular displays in the night sky has to offer. Meteors sometimes fell so thick it would appear as though the entire sky were falling, or give the appearance of rapid forward motion of the Earth through the stars.

Meteor storms are generally caused by young meteor streams, in which the majority of the streams' mass is still concentrated along that portion of the orbit occupied by the parent comet. Due to slight variations in orbital velocity, as a stream ages, the particles tend to distribute themselves along the path of the orbit in a more even manner. Meteor storms occur when the Earth crosses the orbit of the meteor stream, at the same time that the main mass of the young meteor stream is crossing the orbit of the Earth. For streams with a low potential for orbital perturbation, this event may occur on a periodic basis, generally at around the same time that the parent comet becomes visible in the inner solar system. Streams which tend to undergo frequent orbital perturbations may only cause infrequent and rare storms, some never occurring again. To make the possibility even more remote, these streams also tend to be very narrow, with the Earth taking only a few hours to cross the more concentrated portion of the streams' path. Being on the right side of the glove, under good weather, on the right night is very important toward seeing these events. Two meteor streams are associated with the November storms, the Andromedid stream, and the Leonid stream.

The Andromedid stream is one that is subject to

OCTOBER 6TH SHILOH UNRUH PULKOVO OBSERVATORY

NOVEMBER 3: GENERAL MEETING AT THE LOS GATOS RED CROSS. BOB FINGERHUT ON INTRODUCTORY ASTROPHOTOGRAPHY - HOW TO PHOTOGRAPH THE PLANETS.

NOVEMBER 10: BOARD MEETING AT THE RED CROSS, 8 PM (FOR THE REST OF THE YEAR)

NOVEMBER 17: HALLS VALLEY STAR PARTY AT GRANT RANCH

NOVEMBER 17: THERE WILL ALSO BE A STAR PARTY AT HENRY COE PARK. (LESS CHANCE OF CLOUDS THIS TIME OF YEAR).

NOVEMBER 24: NO ACTIVITY

NOVEMBER 30: BRANHAM LANE STAR PARTY, STARTS AT DUSK

DECEMBER 1: GENERAL MEETING AT THE RED CROSS. SPEAKER TO BE ANNOUNCED.

DECEMBER 8: BOARD MEETING AT THE RED CROSS, 8:00 PM.

DECEMBER 15: HALLS VALLEY GROUP PUBLIC STAR PARTY AT GRANT RANCH. SJAA INVITED. STARTS AT DUSK.

DECEMBER 22: NO ACTIVITY. MOON TOO BIG, RED CROSS BUILDING NOT AVAILABLE.

DECEMBER 28 (FRIDAY) - PUBLIC STAR PARTY AT BRANHAM LANE PARK.

frequent orbital perturbations, and as such, only rarely crosses the Earth's orbit in a manner favorable for producing a meteor storm. The last storm produced from this stream was on November 27, 1885; with 13,000 meteors per hour visible at the peak. In contrast, the last appearance of a shower from this stream was in 1940, at only 30 meteors per hour at the peak.

The Leonid stream is much more favorable for producing new storms, and generally tends to produce one every 33 years or so. The last appearance, on November 17, 1966, provided the highest known rate of any meteor stream ever recorded, with an approximate rate of 40 meteors per second (144,000 m/hr), for about 1 hour as viewed from the western portion of North America, and the Pacific. Unfortunately, the east coast and midwest were enveloped in clouds that night, disappointing a lot of amateurs and professionals alike. The next appearance of this storm should be between the years 1998 and 2000, on November 17, plus or minus a day. Reserve those nights to get out under dark skies. If nothing happens you haven't lost anything except sleep, but if something does, you'll never forget it.

INDIVIDUAL SHOWER NOTES:

SOUTHERN AND NORTHERN TAURIDS - Taurids never produce high rates. This shower is peculiar because of its long duration, and enables everyone to enjoy at least some autumn nights with Taurid activity. From time to time you may have the luck to see a slowly moving colorful Taurid fireball. The peaks for these showers are quite broad, and overlap somewhat. This year, the S. Taurids peak around Nov. 3, with a full Moon nearby, while the N. Taurids peak around Nov. 13, with a more favorable crescent moon rising before sunrise. The best time of the evening for activity from this radiant area is around 1 to 2 a.m., when the radiant crosses the meridian.

LEONIDS - The Leonids are beyond doubt the most spectacular meteor stream observed in the past 200 years. Strong showers occurred in 1799, 1832-1834 (14,000 m/hr), 1866-1868, 1901 and 1903, 1961, and 1965-1966 (144,000 m/hr). Other years activity is variable, and usually very feeble. Associated with P/comet Temple-Tuttle.

ANDROMEDID - Recurrence of this stream is highly unlikely, but the possibility exists. Strong showers occurred in 1741, 1798 (400 m/hr), 1830, 1838 (100 m/hr), 1847 (150 m/hr), 1867, 1872, 1885 (13,000 m/hr), 1892 (300 m/hr), 1899 (100 m/hr), 1904 (20 m/hr), and 1940 (30 m/hr). Subsequent activity has been very weak. Associated with P/Comet Biela.

Ref:

(1) Cook, A.F., "A Working List of Meteor Stream", Evolution and Physical Properties of Meteoroids, NASA (1973)

(2) Roggemans, P. (ed), "IMO Handbook for Visual Meteor Observations", Sky Publishing Co. (1989)

THE ASTRONOMY BOOK-SHELF

-RICHARD PAGE

Astronomers' Stars
Patrick Moore

SJAA EPHEMERIS

Norton, 1989
164 pages, \$17.95

Popular astronomical writing lends itself to a wide spectrum of approaches, from the detached textbook technique, which provides volumes of facts at the risk of testing the reader's endurance, to the personal anecdotal style which may captivate the reader at the expense of substantive content. In Astronomers' Stars, world renowned author and popularizer Patrick Moore has concocted a strategy which happily marries these extremes, resulting in a book which is pleasurable to read yet provides a reasonably comprehensive introduction to its subject matter, stellar astronomy.

Astronomers' Stars begins with a brief chapter introducing basic concepts, such as interstellar distance, constellations, magnitudes, stellar nomenclature and galactic scale. For the remainder of the book, each of the sixteen chapters is organized around a different scientifically notable star (or seeming star). These stars range from the well-known through the vaguely familiar to the outright obscure; from Sirius and Vega, through Eta Carinae and Epsilon Aurigae, to S Andromedae and Becklin's star. Moore's literary device is to use each star as a starting point to launch an exploration into a different facet of stellar astronomy. Thus each star, while itself the subject of an historical and scientific retrospective, serves to illuminate a more general principle of astronomy. The subject of one chapter, for example, is Mizar and double stars, the spectrum, and spectroscopic doubles. Another chapter deals with Algol and eclipsing binaries, while a third on CN Tauri explores novae, supernovae, neutron stars and pulsars. In this fashion Moore introduces the reader to such diverse subjects as cosmic-distance scale, stellar evolution, planetary formation, variable stars, x-ray and infrared sources, radio astronomy, and even quasars.

Astronomers' Stars is intended as an introductory survey of stellar astronomy, and as such covers ground that will doubtless be familiar to those reasonably well-acquainted with the astronomical literature. Despite the familiarity of the subject matter however, I found myself engrossed in the book, both because of the undeniable charm of Moore's writing style, and the liberal lacing of his narrative with personal anecdotes and delectable historical asides. For example, have you ever heard of Roderick Willstrop? You would have except for a shortage of available computer time at Cambridge University which prevented Willstrop from making a timely analysis of his observations, and thereby becoming the first person ever to see the Crab Pulsar flashing in the depths of the supernova remnant. Or can you imagine the venerable Edwin Hubble as lawyer and amateur boxer? He was both. I would venture a guess that most of you are familiar with the name Harlow Shapley. Surely he must have nurtured a long youthful passion for the profession that brought him such fame. Actually he became involved in astronomy merely to kill time until a course opened up in his original field of interest, journalism! (Fortunately he, like the rest of us, became hooked!) In addition to tidbits such as these, Moore relates some of his personal experiences as an amateur, which can hardly fail to elicit a sympathetic response from readers with like interests.

One final aspect of the book that adds to its appeal is Moore's emphasis on the unknown in the realm of astronomy. Time and again he deals with the curious

and sometime bizarre phenomena from which we have tantalizing clues but no satisfactory theories. His vivid depiction of current speculation enlivens the text and helps remind us of the dynamic

THE EYE AND ITS ABILITY TO VIEW DIM CELESTIAL OBJECTS

c. 1990 - STEPHEN R. WALDEE

Beginning astronomers are often misled by incomplete or incorrect textbooks or advertisements implying that "long focal ratio" optical instruments offer dimmer views than "fast" or short focal length optics. Consequently, many visual astronomers mistakenly shy away from refractors or catadioptric telescopes in favor of short-focus Newtonians, expecting that deep-sky objects will be brighter and more spectacular. In some respects, they're both right -- and wrong.

As discussed previously, the telescopic visual image brightness is determined by the light-gathering area of the lens or mirror, not its focal length. Then why do some commercial manufacturers loudly trumpet the "brighter views" of their short-focus instruments? I recall a series of ads introducing a new Schmidt-Cassegrain a bit over a year ago that led many of my telescope customers to expect an f/6 SCT to be brighter than the old standard f/10 model. "Tain't so!"

With the f/6 scope it was easier and more convenient to achieve the critically-necessary 7mm "exit pupil" than with the longer focal-length f/10 scope, since the former scope gave, eyepiece for eyepiece, lower powered views. As the manual for my new Coulter 17.5" scope dramatically describes the issue, the telescopic magnification that creates a 7mm exit pupil of light from the eyepiece achieves "VISUAL EQUALIZATION." This means that the image presented to the eye by the output of the instrument, though magnified many times beyond normal perception, is just as bright as it would be to the "1 power" naked eye. Nothing is really lost in image brightness at this specific power of magnification, but above it, brightness suffers, be the object viewed a star, planet, or nebula.

No matter what the focal length and ratio of the telescope, if an eyepiece that provides a 7mm exit pupil is employed, the image will be as bright as the instrument is capable of delivering. Of course, the contrast between light and dark is reduced by the area of a reflector's secondary mirror obstruction, in proportion to the area blocked. For this reason, an 8" Newtonian will often produce higher contrast views of nebulae than an 8" Schmidt-Cassegrain, particularly one of the new "wide-field" models with a large secondary mirror that blocks nearly 40% of the incoming light! But a small aperture instrument of ultra-high quality (such as a Questar or Starfire refractor) with exceptionally smooth, well-baffled and coated optics, will predictably outperform much bigger inexpensive light-bucket Dobsonians.

To calculate the value of magnification necessary for "Visual Equalization" in your scope, Coulter instructs you to multiply the light-gathering aperture in inches by the number 3.629. Another way to determine the 7mm exit pupil is to divide the aperture

diameter in millimeters by the magnification; for example, 7 X 50 binoculars provide just over 7mm exit pupil at 7 powers of magnification.

In the last year I've been having lots of fun with "7mm exit pupil astronomy" using a home-made rich field refractor. Paul Mancuso found a source for inexpensive high-quality 70mm surplus photocopier lenses at Alltronics in San Jose. For less than \$30 I built a scope that — believe it or not — showed me a tiny but perceptible "Horsehead nebula" one dark winter's night, employing the magic 7mm exit pupil...of course, a light pollution filter helped, and that will be the next installment's topic.

COMET COMMENTS

- DON MACHHOLZ

Three new faint comets have been discovered recently, but they are not expected to get very bright. Comet Levy is in the solar glare, we'll see it in our morning December sky. Periodic Comet Wild 2, which will be closest to the Sun at 1.58 AU on December 16, emerges into our morning sky. Also there we find Comet Tsuchiya-Kiuchi, which is magnitude eight.

Comet Mueller (1990j): Jean Mueller, working on the Second Palomar Sky Survey, discovered this comet on photos taken Sept. 15. An early orbit suggests that it will be closest to the Sun next February at 1.6 AU, when it might reach magnitude 15. (Oh Boy! - ed.)

Comet Holt-Olmstead (1990k): Henry E. Holt and C. Michelle Olmstead report their discovery of this comet on Sept. 14. They were using the 18" Schmidt at Palomar. The comet was closest to the Sun in late September at 2.0 AU and has an orbital period of 6.2 years. It will not get brighter than magnitude 17.

Comet Mueller (1990L): Jean Mueller discovered this comet from Palomar. It is magnitude 18, but no orbit is yet computed.

SEEKING COMETS

This month we look at the comets found with refractors and Schmidt-Cassegrains. I include aperture size in inches and other instrument data, the comet's discovery magnitude, elongation and sky (Morn. or Even.), and the number of hours to find the comet.

SPACE PROGRAM UPDATE

-BOB FINGERHUT

ULYSSES ON WAY TO STUDY SUN - Ulysses was launched on the shuttle Discovery on October 6. Six hours after reaching orbit, Ulysses was released from the orbiter's cargo bay. Sixty five minutes later, the first of three stages of the Inertial Upper Stage/Payload Assist Module (IUS/PAM) ignited. The IUS/PAM boosted the 814 lb spacecraft to more than 100,000 mph. Ulysses trajectory will take it out to Jupiter where Jupiter's gravity will throw it out of the ecliptic and into an orbit over the Sun's poles. In 1995 Ulysses will pass under the Sun's south pole at a distance of 200 million miles. From this solar latitude that has never been studied before, Ulysses will take measurements of the structure of the solar wind and magnetic field and will measure radio bursts from the Sun, plasma waves, and solar x-rays and galactic cosmic rays. Ulysses carries nine instru-

ments including twin magnetometers, a solar wind plasma experiment, an ion composition spectrometer, an energetic particle experiment, a low-energy charged-particle experiment, a radio and plasma wave experiment, a solar flare, x-ray, and cosmic gamma ray burst detector, and cosmic dust, coronal sounder and gravity wave search experiments.

After releasing Ulysses, Discovery remained aloft for three more days to conduct experiments. The shuttle carried a solar back-scatter ultra violet instrument to measure atmospheric ozone characteristics to help calibrate NOAA 9 and Nimbus 7 satellite ozone data. In another experiment, solar cells are being exposed to determine there is serious degradation to solar array materials from the impact of atomic oxygen molecules in low Earth orbit. If there is serious degradation, a plan to rescue a stranded communication satellite in 1992 could be dropped.

ASTRO-1 SPACELAB MISSION DELAYED - The planned launch of Columbia in September was delayed again due to a hydrogen leak. If repaired in time another launch attempt will be made in December. But first, an attempt will be made in November to launch Atlantis with a classified Department of Defense payload.

MAGELLAN RETURNING IMAGES OF VENUS - Magellan has regained high data rate communications and is back in a normal operating mode. Radar images being returned show meteor craters and volcanic domes with 400 ft. resolution. Venus' dry surface and low (3-7 ft./SEC) winds result in surface features lasting longer than on Earth. Venus' surface is also older than Earth's (300 million - 1 billion years vs. 200 million) due to a lack of tectonic plates.

PIONEER 10 FIFTY AU FROM THE SUN - The milestone was reached on September 22. The spacecraft is still searching for the end of the heliosphere.

ASTRO ADS

ASTRO ADS are free to all non-commercial advertisers wishing to sell astronomically related products or services. Please send your ad directly to the Editor, John P. Gleason, 5361 Port Sailwood Dr. Newark, CA 94560 NO LATER THAN THE 15TH OF EACH MONTH. Your Astro Ad will run approximately 3-months.

WANTED: Trade desired. I have a 40mm Televue 1.25" Plossl; I need a 32mm Plossl of high quality. Contact Steve Waldee, 408-993-1976. 11/90

OLYMPUS CAMERA OUTFIT - The perfect astrocamera. Two (2) OM1-N bodies, Spiratone 12mm f/8 fisheye, Amcam 28mm f/2.8, Olympus 50mm f/1.4, Tokina 235-200 f/3.5 macro zoom, Soligor 200mm f/3.5, Soligor Quick-Set/Husky tripod, Olympus Veri-mag 1.2x/2.5x right angle rotating focusing magnifier, large padded brown case, Vivitar 283 auto flash, Olympus #12 focusing screen for telescope or long telephoto lenses and miss. filters & accessories. \$350. Contax/Yashica Lenses: Soligor 80-200mm f/4.5 macro zoom, \$55. Carl Zeiss 35mm f/2.8, \$125. Astronomy Equipment: Tectron 2" low profile ultra smooth focuser \$40. Spectra Sure Sharp focuser for Olympus \$45. A detailed list of all equipment for sale is available. Jim Baumgardt 415-692-5337. 11/90

TELESCOPES AND ACCESSORIES - Meade

model 622 6-inch f/3.6 wide field Schmidt-Newtonian on Meade equatorial mount. 2" focuser, 25mm eyepiece. Used twice. Excellent condition, \$700. Telrad Finder, \$30. Lumicon 80mm Super Finder, \$150. Celestron 5X24 orange finderscope with bracket for C5, \$20, Celestron 6X30 orange finderscope with bracket for C8, \$20. Celestron 10X40 orange finderscope with bracket for C14 \$45, Celestron 10X70 giant finder with bracket for C14, \$140. Declination motor for sandcast C8, \$20. Celestron T-Adapter for camera (T-ring for your camera not included), \$15. Celestron tangent assembly for C8/C14 \$175. Orion Telescope Center Dew gun, \$5. 1 1/4" Optica filter set, green, red, yellow, orange, violet, blue, and Moon filter, 19mm clear aperture, \$25. .965" star diagonal from C90, \$5. Tuthill polar axis finder, \$45. Meade #603 D.C. cord 25' with cigarette plug for use with #784 motor, \$15. Meade #604 A.C. converter with 25' cord for use with #784 motor, \$20. Home made 8-inch f/4 Newtonian optical tube assembly with Novak spider and mirror cell, Meade 680 focuser, end rings, dust caps, 2.60" secondary. Optical performance unknown (my first and last mirror). No finder or eyepiece included. Make Dobsonian mount and your all set, \$175. (hardware alone a \$164 value) All above equipment is in new or very good condition. Bill Dellenges, 415-792-9206

10-inch NEWTONIAN telescope with equatorial mount, motor drive, Richfield scope, spotter scope and is on a tripod with casters. \$1500/obo. Contact Nancy Piekarczyk 415-632-6542. 10/90

MEADE motor drive for model 100 equatorial mountings. Fits models 291 and 300 refractor telescopes that came with this mounting. Never used, \$50. Martin Miller, 415-898-1765 10/90

CELESTRON SUPER C8 w/tripod, wedge, 8 X 50 finder, 26mm Plossl, 7 mm Ortho eyepieces, 120/12 V. TeleDrive R.A. & Dec. drive, counter weights, original case...seldom used. \$900/obo. Herb Builtemen, 867-3917 10/90

CELESTRON C4.5 Newtonian reflector in excellent condition. 25 mm Kellner eyepiece and a 2X Barlow, along with all the standard options Celestron offers in this package. Asking \$400. Ralph, 408-943-6155 or 408-262-2826 10/90

CELESTRON SUPER C8 PLUS w/starbright coatings, Byers drive, latitude adjuster, wedge, tripod, piggyback camera mount, star diagonal, 26mm Plossl eyepiece, 7mm Ortho eyepiece, 8 X 50 finder, Lumicon Easy Guider for deep sky photography, tele-extender for planetary photography, 2X deluxe Barlow, dual axis drive corrector, declination motor, dew cap lens shade, counterweight bar, extension tubes. All equipment in mint condition. \$1200 takes it all. David Schamber, 209-333-0919 after 7 pm. 10/90

CELESTRON C90 W/case. \$250. Contact: O.C. Fox 415-856-6666. 9/90

CELESTRON 5 1/2" Schmidt Camera with 3 film holders, 1 roll film holder, filter holder, #29 & #92 filters, mounting rings for Super Polaris Mount, mounting rings for 60mm guidescope, carrying case & manual. \$1350. Contact: Jim Eiselt, 408-374-5491. 9/90

Comets Found With Refractors						
COMET	DISCOVERER	TELESCOPE	MAGNITUDE	ELONG	SKY	# HRS.
1983d	Araki	3.0", 27x	6.4	92	M	132
1978j	Haneda	3.3"	10.0	147	E	463
1990b	Cernis	4.8", f/5, 35x, 1.8d	8.6	49	E	631
1978j	Campos	5"	10.0	147	E	116
1975d	Bradfield	6", f/5.5, 26x, 2.2d	9.3	30	M	145
1975p	Bradfield	6", f/5.5, 26x, 2.2d	9.7	58	M	106
1976a	Bradfield	6", f/5.5, 26x, 2.2d	9.4	56	E	57
1976d	Bradfield	6", f/5.5, 26x, 2.2d	8.8	44	M	9
1978c	Bradfield	6", f/5.5, 26x, 2.2d	8.0	48	M	360
1978o	Bradfield	6", f/5.5, 26x, 2.2d	8.4	32	M	75
1979c	Bradfield	6", f/5.5, 26x, 2.2d	10.2	44	E	98
1979L	Bradfield	6", f/5.5, 26x, 2.2d	5.0	26	M	67
1987s	Bradfield	6", f/5.5, 26x, 2.2d	8.8	81	E	307
1982g	Austin	6", f/8, 18x	10.4	68	M	151
1984i	Austin	6", f/8, 18x	5.8	69	M	43
1984t	Rudenko	6", f/8, 30x, 2.1d.	9.4	60	E	247
1987u	Rudenko	6", f/8, 30x, 2.1d	9.8	61	E	266
1989r	Rudenko	6", f/8, 30x	10.6	75	E	174

Comets Found With A Schmidt-Cassegrain Telescope						
COMET	DISCOVERER	TELESCOPE	MAGNITUDE	ELONG	SKY	# HRS.
1977m	Kohler	8", 100x	9.5	68	E	---

Additional Data From Last Month's Listing

COMET	DISCOVERER	INSTRUMENT	MAGNITUDE	ELONG	SKY	# HRS.
1975k	Suzuki	5.8", 22x	8.8	52	M	460
1975h	Kobayashi	6", 30x	7.6	133	M	91
1975j	Sato	6", 25x	10.7	65	M	203
1975q	Sato	6", 25x	9.8	78	M	16
1975j	Fujikawa	6.2", 23x	10.7	65	M	560
1987c	Nishikawa	6"	8.4	66	E	3024
1990c	Levy	16"	10.2	66	M	60
1984j	Takamizawa	20x120 Binoculars	9.4	171	M	270
1987c	Takamizawa	25x150 Binoculars	8.4	66	E	699
1987c	Tago	25x150 Binoculars	8.4	66	E	---
1987d	Terasako	25x150 Binoculars	6.9	41	E	---
1987d1	Ichimura	20x120 Binoculars	8.5	141	M	---
1988r	Yanaka	25x150 Binoculars	9.3	38	M	---
1989a	Yanaka	25x150 Binoculars	10.7	81	M	---
1990b	Kiuchi	25x150 Binoculars	8.6	49	E	1440
1990b	Nakamura	20x120 Binoculars	8.6	49	E	2236
1990i	Kiuchi	25x150 Binoculars	8.8	64	E	---

CELESTIAL CALENDAR - NOV-1990
by Richard Stanton

LUNAR PHASES Date Rise Tran Set
FM 13:48hr 02-11 1646 2348 0651
LQ 07:02hr 09-11 2320 0604 1246
NM 01:05hr 17-11 0735 1218 1656
FQ 05:11hr 25-11 1229 1817 2358

NEARER PLANETS

Mercury.....07-11 0738 1230 1719
1.34 A.U. 17-11 0817 1249 1717
Mag -0.4 27-11 0850 1309 1724

Venus.....07-11 0641 1157 1710
1.70 A.U. 17-11 0706 1208 1707
Mag -3.9 27-11 0728 1219 1706

Mars.....07-11 1817 0128 0839
0.53 A.U. 17-11 1728 0038 0749
Mag -2.0 27-11 1638 2347 0656

Jupiter.....07-11 2244 0542 1238
4.99 A.U. 17-11 2208 0505 1201
Mag -2.3 27-11 2129 0427 1122

Saturn.....07-11 1122 1615 2102
10.5 A.U. 17-11 1046 1539 2026
Mag +0.5 27-11 1009 1503 1951

SOL Star Type G2V Mag -26.72

1447-1625.....07-11 0640 1152 1700
1528-1852 17-11 0650 1153 1652
1610-2102 27-11 0658 1154 1646

ASTRONOMICAL TWILIGHT

JD 2,448,202.5..07-11 0459 - 1827
212.5 17-11 0509 - 1820
222.5 27-11 0518 - 1815

SIDEREAL TIME

Transit Right...07-11 0000 PST= 0257
Ascension at 17-11 0000 PST= 0337
Local Midnight 27-11 0000 PST= 0416

DARKEST Saturday Night...November 17

TIMES & DATES ARE PACIFIC STANDARD

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EPIHEMERIS CONTRIBUTORS

Don Machholz - 408-448-7077
Pat Donnelly - 408-778-2741
Richard Stanton - 408-662-0205
Steve Waldee - 408-292-2824
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COMET EPIHEMERIS

DATE (UT) RA (1950) DEC RA (2000) DEC ELONG SKY MAG

Periodic Comet Wild 2 (1989t)

10-26	11h23.1m	+00°27'	11h2.79m	+04°11'	42°	M	11.6
10-31	11h36.7m	+03°08'	11h39.3m	+02°51'	43°	M	11.5
11-05	11h50.4m	+01°47'	11h53.0m	+01°30'	45°	M	11.4
11-10	12h04.2m	+00°26'	12h06.8m	+00°09'	46°	M	11.3
11-15	12h18.1m	-00°56'	12h20.6m	-01°13'	47°	M	11.2
11-20	12h32.0m	-02°17'	12h34.5m	-02°34'	49°	M	11.1
11-25	12h45.9m	-03°38'	12h48.5m	-03°54'	50°	M	11.1
11-30	12h59.9m	-04°57'	13h02.5m	-05°13'	51°	M	11.0
12-05	13h13.9m	-06°15'	13h16.5m	-06°18'	53°	M	11.0
12-10	13h28.0m	-07°30'	13h30.6m	-07°46'	54°	M	10.9

Comet Tsuchiya-Kiuchi (1990i)

10-26	10h39.8m	-06°29'	10h42.3m	-06°45'	49°	M	7.7
10-31	10h31.4m	-09°25'	10h33.9m	-09°40'	56°	M	7.7
11-05	10h21.0m	-12°44'	10h23.5m	-12°59'	62°	M	7.7
11-10	10h08.1m	-16°31'	10h10.5m	-16°45'	69°	M	7.6
11-15	09h51.5m	-20°48'	09h53.9m	-21°02'	76°	M	7.6
11-20	09h30.1m	-25°37'	09h32.3m	-25°50'	84°	M	7.6
11-25	09h02.9m	-30°47'	09h04.1m	-30°59'	91°	M	7.6
11-30	08h25.4m	-35°56'	08h27.3m	-36°05'	99°	M	7.6
12-05	07h39.6m	-40°22'	07h41.3m	-40°29'	105°	M	7.7
12-10	06h46.5m	-43°19'	06h48.0m	-43°22'	110°	M	7.9

THIS MONTH'S METEORS

SHOWER NAME	DATES	DATE OF MAXIMUM	MAXIMUM VISUAL ZENITHAL RATE (per Hr.)	RADIANT POINT (ON MAX DATE)		VELOCITY km/sec.	NOTES
				R. A.	DEC		
Southern Taurids	Sept. 15-Nov. 26	Nov. 3	15 (w/ N. Taurids)	3h 22m	+ 14	27.0	long duration shr w/ N. Taurids
Pegaside	Oct. 29- Nov. 12	Nov. 12	<1	22h 20m	+ 21	11.2	weak visual stream very slow velocity
Northern Taurids	Sept. 19- Dec. 1	Nov. 13	15 (w/ S. Taurids)	3h 53m	+ 22	29.2	long duration shr w/ S. Taurids
Leonids	Nov. 14- Nov. 20	Nov. 17	1-2 (variable)	10h 9m	+ 22	70.7	periodic storms very swift velocity
Andromedids	Nov. 27 (only)	Nov. 27	1-2 (variable)	1h 4m	+ 44	16.5	rare storms very slow velocity
Monocerids	Nov. 27- Dec. 17	Dec. 10	<1	6h 39m	+ 14	42.4	weak visual stream medium velocity

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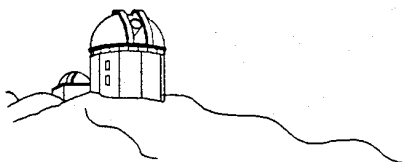
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