



EPHEMERIS

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September, 1990

SLIDE AND EQUIPMENT NIGHT

The September meeting is, by tradition our Slide and Equipment Night. As with last year's event, the equipment and slide presentation will be preceded by a Swap Meet. Slide and Equipment Night got started many years ago with the idea that it would be nice for individual members to conduct a "show and tell" of their telescopes, accessories, and astrophotography. This eagerly awaited annual event often featured several dozen astronomical instruments and hundreds of slides. Back in 1976, it was how I got introduced to the SJAA. I'm saddened to hear that this hasn't been the case in recent years. Well, perhaps we can change all that. Members new and old are asked to participate in the event. Have you made a special modification to your C8? Taken a good astrophotograph lately? Then bring it on in to share.

The Swap starts at 4:00 pm and runs to 7:30 pm. SJAA commission on Swap sales is 10%. Sellers must keep record of sales, and pay or make arrangements to pay, before leaving. Though the Swap is not widely advertised, it is not restricted to SJAA people!

MEMBERSHIP RENEWALS LAST CALL!

Members who receive Sky & Telescope as part of their SJAA membership should have renewed by now. SJAA members who have not renewed their membership be forewarned that this is your last issue of the Ephemeris. To renew please use the handy membership application on the back of the Ephemeris, and mail it to Jack Peterson our Treasurer.

YOSEMITE STAR PARTY

The annual pilgrimage to Yosemite National Park was a great success. We entertained a couple hundred people, showing many objects that we can never show from Branham Lane Park. Enough customers to be worth-while, and not so many that we couldn't answer questions, teach observing technique, etc. Weather was perfect, the sky likewise. Looking forward to next year!

CLASS REMINDER

For September, the outdoor session of the Introductory Astronomy Class meets at Fremont Peak State Park on Friday, Sept. 14, rather than at Grant Ranch on Saturday. This is this year's final session of the class.

AANC CONFERENCE

The Astronomical Association of Northern California sponsors an annual conference, this

year at the Lawrence Hall of Science in Berkeley. October 27 & 28 will see amateur and professional speakers, equipment and photography show, banquet, and a star party at LHS on Saturday evening. The AANC requests papers/speakers for the conference. If you can put together 20 minutes plus 10 minutes for questions, call Jim Van Nuland for details for submission. You need only an abstract for the submission.

SEPTEMBER 1ST SLIDE AND EQUIPMENT NIGHT

SEPTEMBER 1: SWAP MEET, SLIDE AND EQUIPMENT NIGHT AT THE RED CROSS. SWAP MEET TENTATIVELY SCHEDULED TO RUN FROM 4PM TO 7:30 PM, WITH SLIDE & EQUIPMENT SHOW STARTING AT 8 PM.

SEPTEMBER 8: BOARD MEETING AT THE RED CROSS, 6:30 PM, FOLLOWED BY THE INDOOR SESSION OF THE ASTRONOMY CLASS AT 8 PM.

SEPTEMBER 14: (FRIDAY) THE OUTDOOR SESSION OF THE INTRODUCTORY OBSERVATION ASTRONOMY CLASS MEETS AT THE OBSERVATORY AT FREMONT PEAK STATE PARK. THE 30-INCH WILL BE AVAILABLE FOR GENERAL OBSERVING.

SEPTEMBER 15: HALLS VALLEY GROUP PUBLIC STAR PARTY AT GRANT RANCH. SJAA INVITED.

SEPTEMBER 22: AANC FREMONT PEAK STAR PARTY.

SEPTEMBER 28: BRANHAM LANE STAR PARTY AT DUSK

SEPTEMBER 29: NO ACTIVITY

OCTOBER 6: GENERAL MEETING 8PM. SHILOH UNRUH, GUEST SPEAKER.

OCTOBER 13: BOARD MEETING 8 PM AT THE LOS GATOS RED CROSS.

OCTOBER 20: HALLS VALLEY GROUP PUBLIC STAR PARTY AT GRANT RANCH.

THE ASTRONOMY BOOKSHELF

- RICHARD PAGE

Observing the Constellations

John Sanford

Simon and Schuster, 1989

176 pages, \$26.95

Most popular guides to the night sky, such as Burnham's or Webb's, are simply descriptive, and require a set of charts for use at the telescope. Those providing charts, such as Norton's or Vehrenberg-Blank's, usually only provide listings of objects, without any detailed descriptions. By virtue of combining these elements, John Sanford's Observing the Constellations comes as a welcome offering to the amateur community.

The book, in 8" X 11" format, opens with a brief introductory chapter followed by alphabetically organized constellation descriptions, charts and photos. The introduction, like many another I've encountered, strikes me as superfluous, in that it is inadequate to the needs of the complete novice, while too basic for even a modestly knowledgeable observer. I would like to see an end to the prevailing notion that every guide must be a textbook and vice versa. A simple explanatory note on the organization and use of the guide would have been sufficient.

In the main body of the book each of the major constellations is given a separate section, while some of the smaller and fainter contiguous groups are treated two or three together.

All 88 constellations are included. Each section features a photograph of the star field covered, chart, list of principal objects of interest and descriptions of these objects. Unfortunately, the star field photographs are virtually useless because most of them reveal far more stars than one is ever likely to detect with the naked eye. Since the primary stars of a constellation do not stand out in a print as they do in a transparency or the real night sky, the outline of the figure becomes hopelessly lost in a myriad of pinpoints.

No such confusion mars the utility of the star charts, however. Drawn by the redoubtable Wil Tirion with his usual inimitable clarity, each chart is about 1/2 page in size, including a generous marginal area of sky around the fainter constellations that allows for easy orientation to brighter and more familiar groups. While charts on so small a scale naturally preclude any great detail (the magnitude limit is about 6) they are nevertheless generally adequate for locating the mostly bright objects they encompass. For the unseasoned observer in particular the trade-off of large scale detail for small scale comprehensibility and clarity will prove worthwhile. The relevant data for most (but not all) objects depicted on each chart is provided in a separate table, each of which is divided into deep sky objects and (mirabile dictu!) double and multiple stars (remember those?).

The test accompanying the charts and tables reveals Sanford's extensive familiarity with the night sky. He first describes each constellation or group in a general way, and then proceeds to specific objects, concentrating on the most conspicuous and accessible of these. The reader is given a good impression of their appearance through a variety of apertures from naked eye and binocular through 16" and larger. This type of information can be invaluable to a novice whose uninformed expectations may lead him on many a futile and disheartening search. Intermingled within these descriptions is data on the nature, size and distance of the objects, lending the reader some perspective on the subjects of his observations. All this material is presented in a fluid, clear and pleasant style.

Despite a few flaws, I can recommend Sanford's fine effort as a convenient and useful field guide, especially for those who have gotten their astronomical feet wet but are not yet ready to take the plunge into the depths of Burnham's Celestial Handbook and the Uranometria.

THE EYE AND ITS ABILITY TO VIEW DIM CELESTIAL OBJECTS

- PART FOUR

c 1990 - STEPHEN R. WALDEE

In earlier installments, we have learned of the history of astronomical dark adaptation, the nonlinear color intensity registration called the "Purkinje" effect, and about the retina's incredible sensitivity to faint light, compared to photographic film's ability to collect photons over time. Now we'll explore other optical differences in astronomy between the photographic process and the eye.

Any good photographer soon learns about the effect of the focal ratio of his or her camera lens in determining the exposure time needed for a particular scene. In "prime focal" astrophotography (with the film negative, instead of a visual ocular, employed at the focus of the telescope), focal ratio of the optical system directly determines the exposure time for extended objects like nebulae or galaxies. Thus, even if we employ a small lens of only, say, 50mm aperture, we can achieve as deep an exposure as a lens of 500mm or 5,000mm aperture as long as the focal ratio is the same.

But since this ratio is determined by dividing the light-gathering aperture by the focal length, even if the dividend remains constant ($f/5$, for example), the other numbers can vary widely. At a constant focal ratio, a lens of increasing aperture will produce an extended object's focused image of increasing diameter.

Thus, a 10" aperture $f/5$ scope will record a larger prime-focal image of M8 on a film negative than will a 3" aperture $f/5$ scope. If you enlarge the negative from the 3" scope to equalize the size of the photographs, then even though you have two "Lagoon" nebulae of the same size, the image made by the larger scope will probably have finer detail and less grain. In addition, fainter pinpoint stellar images will be recorded by the larger scope, which has an increased "limiting magnitude" for registering dimmer stars.

But the telescope/eye combination behaves differently. Instead of recording an image directly at prime focus as with a camera, our retina resolves a telescopic image through two extra lens systems, the one in the ocular plus the lens in our eyeball. When we compare an image at the exact same magnification in two telescopes of differing apertures and focal ratios, we are manipulating the telescopic "exit pupil," the diameter of the cone of light that leaves the

ocular and enters through the "entrance pupil" of the eye's iris. To use different types of telescopes at the same magnification, we may have to select different focal-length eyepieces to get the same exit pupil and power from both scopes; consequently, the image brightness should then be related to the aperture and not the focal ratio of the telescope.

In visual astronomy, the larger aperture gathers more photons over a wider area, whether the focused image is of a galaxy, nebula, or star, and the big diameter optics should provide a brighter image at the same power than the small diameter lens or mirror. In Pt. 5: F/ratio and brightness.

METEOR NOTES

- JIM RICHARDSON

September is a mixed month for meteor activity, with several long duration, and short duration minor showers overlapping into it, one good daylight shower, one single occurrence shower, and one moderate nighttime shower occurring within it.

The best visual shower this month is the Southern Piscids, which peak one day after the New Moon on September 20. Look for these slow meteors shortly after midnight, high in the southern sky, with a peak rate of about 5 per hour.

For trying your hand at radio observations, the Daytime Sextantids peak on September 29, with peak radar rates of about 30 per hour. High short-wave frequencies work well, especially if your radio has a CW (or BFO) mode of receiving. Center your dial on a very weak AM carrier signal, and listen for the occasional "whoop" or "chirp" that meteors cause as the carrier signal is rapidly shifted above or below your center frequency by Doppler effect, due to their high velocity.

Most lists of meteor showers are formatted in order of shower start dates. However the date everybody is usually interested in is the peak date, which means you have to go digging down the list to find them. So to break tradition slightly, but make it a little easier to use, I have shifted my list to the peak date format. I will continue to show those showers which overlap into the current month, starting dates, and ending dates.

Individual shower notes:

KAPPA CYGNIDS: Though much weaker, this stream creates a good contrast with the nearby Perseids, which are much swifter and

brighter than these moderately bright, slow meteors.

NORTHERN IOTA AQUARIDS: Early on, this shower is not resolvable visually from the S. Delta Aquarids. It is long, but quite feeble in its late stages. Paired with the S. Iota Aquarids, with the same characteristic meteors.

AURIGIDS: This shower was observed only in 1935, and was strong for 1 hour before morning twilight. Only possible sporadic appearances have occurred since then, and no periodicity has been determined.

SOUTHERN AND NORTHERN TAURIDS: These long duration showers will be with us throughout the fall. They are difficult to tell from one another visually, unless plotted or photographed.

ANNUAL ANDROMEDIDS: This stream begins near the visual Piscids, and then moves northward toward the radiant of the famous Andromedid showers. Two radiants and sets of elements are given to display the changes during the Earth's passage through the stream.

(Data from "A Working List of Meteor Streams", A.F. Cook (1974))

July-August Notes - The last two weeks of July yielded some excellent observing conditions, and observations of the Aquarid group of showers went quite well. Those who went to the July Grant Ranch star party (July 22) may have noticed the occasional slow, bright meteor in the southern sky that night, typical of an Alpha Capricornid, as well as the more average Southern Delta Aquarids, to the southeast. Rates were low that evening, only 1-2 per hour, and I was able to plot 3 radiants (adding the North Delta Aquarids). The following weekend the Alpha Capricornids and South Delta Aquarids peaked, however the S. Delta Aquarids did not perform as usual this year, and only reached 7/ hr at around 2 am local time (0900Z) on July 29th. The Alpha Capricornids. Along with these, three bright Perseids were observed that night, and probably more visible, had I been facing the right way.

Final Note: Remember the possible meteorite fall I mentioned in the May Ephemeris? It turns out that a stony meteorite (common Chondrite) struck the roof of a house in Galnerbury, the Netherlands, on April 17, 1990 at 1832 Z (&:32 pm local). The stone caused some damage and shattered upon impact, and about 500 grams have been recovered. The fireball was reported by hundreds of people.

COMET COMMENTS

- DON MACHHOLZ

One comet has been discovered recently. Meanwhile, Comet Levy is at naked-eye visibility and up for nearly the whole night. Periodic Comets Encke and Honda-Mrkos-Pajdu-sakova, both low in our morning sky are joined by Comet Skorichenko-George. This comet was discovered in the evening sky last December, it is now receding from the Sun (presently this distance is 2.4 AU) while it remains at 3.2 AU from the Earth.

Comet Tsuchiya-Kiuchi (1990i): Kiyoshi Tsuchiya photographed this comet on July 13, it was then visually found by Tsuruhiko Kiuchi on July 16. Kiuchi was using the same 25X150 binoculars he had used to find his first comet (1990b) earlier this year. Independent discoveries were made on July 16 by both M. Zanotta of Italy (his second independent find in the past year) and by X-m Zhou of China. Incidentally, I had swept to within two degrees of it on July 13 before ceasing due to moonlight.

At discovery the comet was in the evening sky near galaxy NGC 4565. Its retrograde orbit takes it to perihelion in late Sept. at 1.1 AU. It is now nearing the Sun in the evening sky; it will emerge into our morning sky in Oct. at magnitude eight.

SEEKING COMETS

In which countries do comet hunters reside? We've seen that in the past, certain locations have dominated. Presently Japan, the United States, and Australia have most of the amateur visual comet discoveries. Below is a table showing each country and the number of first, second and third discoveries of visually-found comets from 1975 through Comet 1990i.

This table does not include four "firsts": the discovery of Comet 1983d by the satellite IRAS, Denning's find in 1881 of a comet later found by Fujikawa (1978), and two photographic finds of comets that were also visually found (1989r and 1990i).

This table shows the location of the discoverer, not his origin. William Bradfield was born in New Zealand, but resides in Australia and is a citizen of that country. David Levy was born in Canada and is a citizen of Canada, but lives in the United States; his six finds are in the USA data.

Additionally, all of these discoverers are male, and ages range from the early twenties to the late sixties. A few are retired, a few are self-

employed, but most are gainfully employed and work normal hours. A fair number work in the technical or electronic fields.

SPACE PROGRAM UPDATE

- BOB FINGERHUT

MAGELLAN INTO ORBIT AROUND VENUS - After a 15 month journey, the Magellan spacecraft fired its solid rocket motor and slipped into a perfect orbit around Venus on August. 10th. Magellan will start radar mapping the surface of Venus later in August with a resolution about 100 yards.

HUBBLE FOCUS PROBLEM - The spacecraft is working well. The spherical aberration affecting the visible light cameras is due to the primary mirror. The null lens used to test the mirror during fabrication was mis-located by about one millimeter. The result was that the wrong curve was put on the mirror. The health of the rest of the spacecraft is excellent. The slewing system is operating faster and more accurately than required. The pointing accuracy is better than .007 arc seconds except during a twang that occurs in the solar panels when the spacecraft enters or leaves Earth's shadow. The control laws in Hubble's computer are being modified to dampen out the twang. The solar panels are producing more power than required and the spacecraft is using less power than expected. The batteries are also holding more amp-hours than expected. Data returned by the European faint object camera and the Goddard high-resolution spectrograph is excellent. The faint object spectrograph and the high speed photometer have not been checked out yet. Scientists are looking at correcting for the primary mirror's spherical aberration when using the wide-field planetary camera by taking longer exposures and using digital processing. Scientific observations could start flowing from the Hubble telescope in September.

GROUNDING OF SHUTTLE FLEET LIFTED - The hydrogen leaks on the Columbia and the Atlantis have been found to be unrelated and able to be fixed quickly. Columbia is being prepared for launch the first week in September carrying the ASTRO-1 spacelab payload. The Columbia leak was in the seal of the drive mechanism that closes the flapper valve on the orbiter side of the 17 inch disconnect with the external tank. The fix was to replace Columbia's 17 inch disconnect system with the one from the orbiter Endeavour, which is under construction. The Atlantis leak is in the flange on the external tank side of the

17 inch disconnect, probably the primary seal. The flight after Columbia, the one that must get off on time, is Discovery carrying the Ulysses solar probe that is scheduled for October 5.

MIR COSMONAUTS COMPLETE REPAIR OF SOYUZ AND MIR - Last month it was reported that the new Kristall module was successfully docked to the Mir space station. Inside the module was a ladder that the cosmonauts were going to use to provide access to ripped insulation on the outside of the Soyuz-9 spacecraft. The ripped insulation was blocking key sensors needed to align the Soyuz for re-entry. The space walk to repair the Soyuz was performed on July 17. The cosmonauts went outside through the airlock hatch of the Kvant-2 module, secured the loose insulation, and then tried to re-enter the space station. That's right - Tried! The long spacewalk had almost depleted their suits oxygen supply and carbon dioxide removal capability and the space station hatch would not close properly. I don't know yet whether they got inside by depressurizing the entire Kvant-2 module or used another airlock, but they did get back inside Mir. Another space walk was made on July 26. This time the airlock hatch was repaired and the ladder and tools used on the earlier space walk were removed. A replacement crew was launched to the Mir space station on August 1 for a 132 days mission. After a two day overlap in which the new crew was brought up to speed on the status of the space station, the Soyuz-9 crew successfully returned to Earth.

FIRST COMMERCIAL ATLAS PLACES SCIENTIFIC SATELLITE INTO ORBIT

The first commercial launch of an Atlas Centaur booster took place on July 25. It was carrying the joint Air Force/NASA combined Release and Radiation Effects Satellite (CRRES). The CRRES will assess radiation effects on microelectronics for military spacecraft, and conduct scientific vapor release experiments for NASA.

ARIANE RESUMES COMMERCIAL LAUNCH SERVICES

- The European, Ariane, resumed operation in July by successfully orbiting two telecommunication satellites from the Guiana Space Center. The flight was the first since the in-flight explosion on Ariane V36 last February. The V36 failure was caused by a piece of cloth that was left in a water line leading to the Viking 5 engines main water valve. The recovery plan calls for four launches in the second half of 1990 and nine in 1991. The target date for the next launch is August 30.

NEWS NOTES

1. An 18th moon of Saturn, designated 1981S13, has been discovered using Voyager 2 data. The 12 mile diameter moon is orbiting inside the Encke Gap and could be responsible for the gap.

2. Great Wall Industry Corp. of China launched two satellites on a Long March 2E booster on July 16. It was the heavy-lift booster's first launch. The launch was from a recently completed second launch complex at the Xichang Satellite Launch Center in southwestern China.

3. The basic configuration of the National Aero-Space Plane (NASP) will be decided in mid-August. The best features from the independent designs of the programs five major contractors are being combined. The NASP, also known as the X-30, is likely to be about 150-200 ft. long, have a wingspan of about 50 ft., and weigh 250,000 - 300,000 lb.

4. Two C-5A transports have been modified to airlift cargo that will be carried by the space shuttle. The C-5A's can now carry cargo sized to the dimensions of the shuttle's payload bay.

5. The Soviet Union has approved initial funding for the development of a new Mir-2 space station. Mir-2 will have a truss structure, similar in design to the U.S. space station, and will be assembled in orbit in the late 1990's.

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.

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SEEKING COMETS

In which countries do comet hunters reside? We've seen that in the past, certain locations have dominated. Presently Japan, the United States, and Australia have most of the amateur visual comet discoveries. Below is a table showing each country and the number of first, second and third discoveries of visually-found comets from 1975 through Comet 1990i.

COUNTRY	FIRST	SECOND	THIRD	TOTAL	# INDIVIDUAL DISCOVERERS
JAPAN	12	8	5	25	17
USA	11	4	2	17	7
AUSTRALIA	13	0	0	13	2
USSR	4	1	0	5	3
CANADA	4	1	0	5	2
NEW ZEALAND	3	0	0	3	1
ENGLAND	1	0	1	2	2
PHILLIPINES	1	0	0	1	1
SOUTH AFRICA	0	1	0	1	1
NORWAY	1	0	0	1	1
TOT. VISUAL	50	15	8	73	37

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CELESTRON 8 perfect condition with Starbrite, dew zapper, Motofocus, Meade tripod, Samsonite style case and more. Call for details. Also, installment payments available. Will sell for best offer. Call after 7 pm, 209-463-1817 Edward Hillyer, 2305 De Ovan Ave. Stockton, CA 95204 9/90

TELESCOPE, EYEPIECES, & ACCESSORIES - All the equipment listed below is near New - Mint + condition. A few items including the telescope have been used twice and most of it has never been used: Televue-Genesis, f/5 Fluorite telescope, includes fitted case, 1.25"-2" adapter, 2 extension tubes and lens hood, asking \$1285. Orion Universal (telescoping) Camera Adapter, \$25. Televue 13mm Plossl, \$65. Televue 15mm Wide Field, \$110. Televue 19mm Wide Field, \$115. Televue 20mm Nagler Type 2, \$295. Celestron 22mm Plossl, \$55. Celestron 26mm Plossl, \$45. Televue 32mm Plossl, \$80. Televue 40mm Wide Field (2"), \$260. 60mm Plossl eyepiece (2"), \$40. Televue 2.5X Barlow lens, \$60. Lumicon Deep Sky filter, \$45. Orion, 5 filter set + moon filter (1.25"), \$40. Brass and Wood, Televue tripod with leg spreaders (made for Genesis), \$295. Will sell all for \$2550. Contact: Marty Lutzker, Cupertino 408-257-8706 or 446-4134. 8/90

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COMET EPIHEMERIS

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

Comet Levy (1990c)

08-22	20h50.4m	+05°35'	20h52.8m	+05°46'	155°	E	4.4
08-27	19h43.6m	-07°13'	19h46.3m	-07°06'	141°	E	4.2
09-01	18h37.8m	-18°55'	18h40.7m	-18°53'	121°	E	4.3
09-06	17h42.9m	-26°54'	17h46.1m	-26°55'	103°	E	4.5
09-11	17h01.3m	-31°40'	17h04.5m	-31°44'	90°	E	4.7
09-16	16h30.7m	-34°31'	16h34.0m	-34°37'	79°	E	4.9
09-21	16h08.0m	-36°19'	16h11.3m	-36°27'	71°	E	5.1
09-26	15h50.6m	-37°31'	15h53.9m	-37°40'	63°	E	5.3
10-01	15h36.7m	-38°23'	15h40.0m	-38°33'	56°	E	5.4
10-06	15h25.4m	-39°01'	15h28.6m	-39°11'	50°	E	5.4

Periodic Comet Honda-Mrkos-Pajdusakova (1990f)

08-22	07h20.7m	+16°05'	07h23.6m	+16°00'	39°	M	8.4
08-27	07h51.9m	+16°13'	07h54.7m	+16°05'	36°	M	8.4
09-01	08h18.9m	+16°01'	08h21.7m	+15°51'	35°	M	8.4
09-06	08h43.8m	+15°32'	08h46.6m	+15°21'	34°	M	8.4
09-11	09h07.8m	+14°46'	09h10.5m	+14°34'	33°	M	8.6
09-16	09h31.1m	+13°44'	09h33.8m	+13°31'	32°	M	8.9
09-21	09h53.8m	+12°29'	09h56.4m	+12°15'	31°	M	9.3
09-26	10h15.4m	+11°05'	10h18.1m	+10°50'	30°	M	9.7
10-01	10h35.8m	+09°37'	10h38.2m	+09°22'	30°	M	10.3
10-06	10h54.6m	+08°07'	10h57.2m	+07°51'	30°	M	10.8

Comet Skorichenko-George (1989e1)

09-11	08h37.2m	-04°20'	08h39.7m	-04°31'	40°	M	11.1
09-16	08h42.5m	-06°01'	08h45.0m	-06°12'	43°	M	11.1
09-21	08h47.5m	-07°42'	08h49.9m	-07°53'	46°	M	11.2
09-26	08h52.2m	-09°24'	08h54.6m	-09°36'	49°	M	11.3
10-01	08h56.5m	-11°07'	08h58.9m	-11°19'	53°	M	11.4
10-06	09h00.6m	-12°50'	09h02.9m	-13°02'	56°	M	11.4

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		
Kappa Cygnids	Aug. 9 - Oct. 6	Aug. 18	5	19h 20m	+55	24.8	slow velocity, good contrast w/Perseids
Northern Iota Aquarids	July 15-Sept. 20	Aug. 20	15	21h 48m	-6	31.2	long duration shr some long paths
Aurigids	Sept. 1, 1935	Sept. 1	30 (1935)	5h 38m	+42	66.3	1935 only
Southern Piscids	Aug. 31 - Nov. 2	Sept. 20	5	0h 24m	0	26.3	best Sept. display for 1990
Kappa Aquarids	Sept. 11 - 28	Sept. 21	<1	22h 32m	-5	16.0	weak visual stream
Daytime Sextantids	Sept. 24-Oct. 5	Sept. 29	30 (rader)	10h 8m	0	32.2	Daytime shr only
Annual Andromedids	Sept. 25-Nov. 12	Oct. 3	<1	0h 2m 1h 20m	+8 +34	23.2 18.2	weak visual stream two components
Northern Piscids	Sept. 25-Oct. 19	Oct. 12	<1	1h 44m	+14	29	weak visual stream
Southern Taurids	Sept. 15-Nov. 26	Nov. 3	15 (w/ N. Taurids)	3h 22m	+14	27.0	long duration shr w/ N. Taurids
Northern Taurids	Sept. 19-Dec. 1	Nov. 13	15 (w/ S. Taurids)	3h 53m	+22	29.2	long duration shr w/ S. Taurids

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