EPHEMERIS

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MEMBERSHIP RENEWALS

Members who receive Sky & Telescope as part of their SJAA membership are already receiving magazine renewal notices. Please use the handy membership application on the back of the Ephemeris to renew your membership and mail it to Jack Peterson our Treasurer. The same goes for those of you who are membership only. It is best to get your renewals in early, as you don't want to miss future exciting issues of your favorite monthly newsletter. Where else can you read about bones being found on the moon! (Other than the supermarket check-out that is.)

ANNUAL PICNIC

The Annual Picnic and Installation of Officers will be held July 7 at Grant Ranch County Park, 1:00 pm to dark, in the Rose Garden picnic area. $3 park day-use fee must be paid at the gate. Chicken, burgers, and hot dogs will be provided at no charge, but to avoid waste or hunger, call or write Jim Van Nuland and indicate how many of your family will attend. Since there's a full Moon, a star party is not planned. Sun telescopes are welcome during the day! Please contact Jim or Tom Ahl for more information.

BRANHAM LANE STAR PARTIES - WE WANT YOU!

Don't forget that the SJAA is holding public star parties on the following Fridays. Here are the upcoming dates: July 27, August 31, September 28, October 26, December 28. Bring a telescope and tell your friends. For more information please contact Tom Ahl or Jim Van Nuland. Their telephone numbers are listed elsewhere in this issue.

THE EYE AND ITS ABILITY TO VIEW DIM CELESTIAL OBJECTS

- PART TWO

c 1990 - STEPHEN R. WALDEE

In part 1 of the series, we recalled the pioneering observations of the Herschels, recording thousands of clusters and "nebulae" (mostly known now as galaxies) for the very first time. Many of these faint objects went unobserved until the revolution of the celestial photography in the last fifteen years of the 19th century fixed the images and confirmed their existence to skeptical astronomers, who had failed to spot them with their long, narrow-field observatory refractors. But since these objects were first perceived by visual means, we amateurs can take heart and try to capture them for ourselves.

JULY 7TH
SJAA ANNUAL
PICNIC
GRANT RANCH PARK
1 PM

JUNE 29: BRANHAM LANE PUBLIC STAR PARTY. STARTS AT DUSK

JULY 7: SJAA ANNUAL PICNIC AT GRANT RANCH COUNTY PARK. 1:00 PM TO DARK. IN THE ROSE GARDEN PICNIC AREA.

JULY 14: BOARD MEETING AT THE RED CROSS, 6:30 PM, FOLLOWED BY THE INTRODUCTIORY ASTRONOMY CLASS AT 8 PM.

JULY 20 - 21: SJAA WEEKEND AT YOSEMITE NATIONAL PARK, WITH OBSERVING AT GLACIER POINT.

JULY 21: SJAA STAR PARTY AT GRANT RANCH, A PUBLIC STAR PARTY AND ALSO PART OF THE ASTRONOMY CLASS.

JULY 27: BRANHAM LANE PUBLIC STAR PARTY . STARTS AT DUSK

JULY 28: INDOOR STAR PARTY AT THE LOS GATOS RED CROSS BUILDING. 8PM

AUGUST 4: GENERAL MEETING 8 PM, SPEAKER TO BE ANNOUNCED.

AUGUST 11: BOARD MEETING AT THE RED CROSS, FOLLOWED BY THE INDOOR SESSION OF THE INTRODUCTORY ASTRONOMY CLASS.

AUGUST 18: SJAA STAR PARTY AT GRANT RANCH, INCLUDING OUTDOOR SESSION OF THE ASTRONOMY CLASS.

The mechanism of the physical response of the eye's pupil to dim and bright light was well known by the beginning of the 1800's, but the science of sense perceptions was still in its infancy. An important discovery was made by the Czech physiologist Jan Purkinje in 1825. While relaxing in his garden during twilight, he discovered that the colors of certain flowers dimmed into invisibility as the Sun set, while others were clearly discernible against the background foliage. He conducted a cleaver series of experiments, and determined that the eye repeatedly and predictably sensed blue-green light under levels of illumination that rendered other colors invisible. His research was published in Berlin in that year, so important was the discovery that ever after it has been known as the "Purkinje effect."

According to scientists, nocturnal animals see no more color than was observed by Purkinje in his dimly-lit garden. Most night creatures have few of the color-sensitive cone cells in their retinas, and thus rely on "scotopic" or rod vision, the type of seeing that we employ to perceive faint images in our telescopes and binoculars. As humans, we are also blessed with the less efficient but color-sensitive cones. But they fail to respond much to faint wisps of nebular light; that's why the greens and pinks of the Orion nebula may be noticeable when viewing through the Fremont Peak 30-inch reflector while employing a wide "exit pupil," but will not be detected by most observers with, for example, and 80mm refractor at a medium or high power.

An excellent overview of human eyesight as related to astronomical observing is contained in chapter 10, "The Power of Vision," in Fred Sharff's charming book, The Starry Room. We should be proud that an important discovery regarding the human celestial perception was made right here in the Santa Clara valley in the late 19th century, when Lick astronomers determined by viewing through a narrow blackened tube that a star as faint as magnitude 8.6 could be detected by the naked eye. And we known from Edward Barnard's pioneering work in plotting the dark nebulae that amazing feats of perception can be accomplished through practice, good dark adaptation, and

viewing in dark skies at the correct optical powers. I myself, though being by no means a visual vizard, have detected by naked eye the presence of the faint outlying Milky Way field reaching across part of the constellation of Orion. Containing members so faint that they are not plotted in the Uranometria atlas that reaches down to 9.5 magnitude, this stretch of dim stardust was unmistakable at Loma Prieta mountain on a dark January night this past winter. Yet in tests with friends, I find that my uncoated glasses seem to reduce my straight-on limit of a "held" stellar object to about a half-magnitude less than others blessed with normal far vision; under these circumstances, I can see no individual star fainter than about magnitude 6.5.

In Part 3: The eye' ultimate sensitivity.

COMET COMMENTS

- DON MACHHOLZ

One new comet has been discovered recently, it may become fairly bright in our summer sky. Comet Austin continues to dim in our evening sky. A third object, Periodic Comet Honda-Mrkos-Pajdusakova passes to within 27 million miles from the Earth in late July, then it continues to brighten in the morning sky as it nears its Sept. 12 perihelion.

Comet Levey (1990c): David Levy discovered this, his sixth comet, on the morning of May 20. At magnitude ten, it was near the north side of the Great Square of Pegasus. David was using his 16" reflector, and had been searching for 60 hours since his previous find last August.

A very preliminary orbit (IAU Cir. 5023) shows the comet closest the Sun at 0.94 AU in early November. It should brighten over the next few months as it passes through opposition and into our evening sky.

SEEKING COMETS

In What part of the celestial sphere are comets found? A plotting of the 51 comets visually found between 1975 and 1989 shows that discoverers avoid neither the Milky Way or the galaxy-ridden areas of the sky. The Southern Hemisphere is well-represented, half the comets are found south of +5 degrees.

Four comets have been found in the constellation Bootes: all of them in the last three years. Three comets have been found in the constellation Hydra.

In each of these constellations two comets were found visually between the years 1975-89: Andromeda, Aquarius, Corona Borealis, Draco, Ophiuchus, Pisces, Scorpius, Ursa Major ...and 28 other constellations have had one comet find in each.

METEOR NOTES

- JIM RICHARDSON

July marks the beginning of the season for summer meteor showers, with several moderate nighttime showers beginning in the latter half of tahe month. When July closes, there will be six ongoing showers; two just past maximum, and three approaching maximum, including the celebrated Perseids.

Nearly all of these showers have radiants which lie in a relatively small area in tahe constellations of Aquarius and Capricornus. This generates a lot of activity from this part of the sky, especially since the maxima are within a couple of weeks of each other. Most of the radiants are so close to one another, that it is impossible to resolve individual shower members visually. Because of this, these showers are normally divided into two groups; the Northern Delta Aquarids, which can be resolved individually, and the Southern Delta Aquarids, which include the Alpha Capricornids, the Southern Iota Aquarids, and the early stages of the Northern Iota Aquarids. The radiant area rises around 0530 Z (10:30 pm PDT) in mid-July, so as usual, the best displays will be in the early morning hours, when only us astronomy minded folks are out and awake anyway (right?). A dark observation site also helps, since light pollution rapidly takes away the ability to spot visual meteors, even if they are above the limiting visual magnitude.

Individual shower notes:

DAYTIME BETA TAURIDS: Associated with the Southern Taurids (Sep.-Nov.), Northern Taurids (Sep.-Dec.), and P/Comet Encke 1970L.

JULY PHOENICIDS: This shower was observed only by radar from 1953 to 1958. It does not appear in visual lists, although it should if it is not a recent arrival at the Earth's orbit.

OMICRON DRACONIDS: A weak visual stream, associated with Comet 1919 V.

SOUTHERN DELTA AQUARIDS: Paired with the Daytime Arietids (early June).

ALPHA CAPRICORNIDS: Also just called the Capricornids. Cook states that they are not resolvable visually from the S. Delta Aquarids, however Norton's (15 ed.) says they are "v.sl.,bright" and associated with comet 1881 V.

SOUTHERN IOTA AQUARIDS: Also called the Piscis Austrinids, they are not resolvable visually from the S. Delta Aquarids. It is paired with the N. Iota Aquarids, with somewhat slow meteors, having long paths.

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.

PERSEIDS: Associated with Comet 1862 III Swift-Tuttle. Numerically one of the years best displays, with swift meteors, usually trained, and orange or yellow in color.

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

May-June Notes - Overall, a poor month for visual observations since I am usually only able to get up to my observation sight on weekends. For two weekends we had a near full moon (full moon on Wednesday), and cloudy or rainy (!) weather the next two weekends. One weeknight gave a dismal 3 per hour sporadic rate, typical of May in the early evening, but hard to stay awake in. However, radio observations in early June gave 48 echoes/hour, the day after the Daytime Arietids and Daytime Delta Perseid maxima, in the late afternoon. Without background sporadic data though, no conclusions can be drawn, which will require further observations.

SPACE PROGRAM UPDATE

- BOB FINGERHUT

HYDROGEN LEAK DELAYS SHUTTLE ASTRO-1 MISSION - The leak is between the orbiter Columbia and tahe duct that connects to the large fuel tank, The shuttle has been rolled back to the vehicle assembly building to change the tank and repair the leak. The mission has been rescheduled for August. Atlantis will be moved to the pat for its scheduled July 9th launch with a classified military payload.

ROSAT X-RAY SATELLITE LAUNCHED - The U.S./German/British satellite was launched on a Delta 2 rocket into 300 mile orbit. Starting in August, Rosat will begin a six month all-sky survey of X-ray sources with wavelengths ranging from 6 to 300 angstroms.

NEWS NOTES - 1. Magellan completed a four-day dry run of its Venus mapping mission on May 25th. Magellan will arrive at Venus on August 10th. 2. Voyager 1 ended it photographic mission with 64 exposures look-

ing back at the solar system its leaving. The exposures have been assembled into a mosaic that suggests the entire expanse of the solar system. 3. NASA has canceled the orbital maneuvering vehicle (OMV). The reason given is budgetary pressure and few near-term requirements for the space tug. $290 million of the $736 million total cost has already been spent or committed. The shuttle will not have to handle reboost of the Hubble Space Telescope and Advanced X-ray Astrophysics Facility at approx $250 million per flight. 4. The Space Exploration Initiative (SEI), to plan a permanent lunar base and a Mars landing by 2019 is headed for a tough time in Congress. The House and Senate Appropriations subcommittees are expected to give NASA zero dollars for SEI in the FY 1991 budget. 5. A checkout of Giotto's instruments have shown that all are functioning normally except the multicolor camera. The optics were damaged during its rendezvous with Halley's comet in 1986. The European Space agency is considering retargeting Giotto for a July 1992 rendezvous with the comet Grigg-Skjellerup.

SOVIET SPACE PROGRAM - The Soyuz-9 spacecraft that is docked to the Mir space station was damaged during launch on Feb. 11. Ripped insulation is blocking key sensors needed to align tahe spacecraft properly for re-entry. An extendible latter that the crew needs to get near and repair the damage was sent up in the Kristall module on May 31. Unfortunately, as of early June, the cosmonauts were having trouble docking the Kristall module to the Mir space station. Will follow-up with the exciting conclusion next month.

FIELD OF VIEW

- JOHN GLEASON

If you've read this far and are wondering about the shorter Ephemeris this month, then question no longer. I will be on a deep-sky-diving vacation soon, so I needed to get this issue out before I went into deep hypersensitization. Astro Ads will appear again next month. Special thanks to Jack Peterson for getting the address labels to me early.

I want to encourage SJAA members to participate in the annual picnic this month. This is always a good time to get acquainted with each other on a social basis, sharing our common interest in the cosmos. Don't let the fact that there won't be a star party following keep you away. Like Jim Van Nuland says, "Bring a solar telescope." Sun spots have been very dynamic in recent days. Please give Jim a call if you plan to attend the picnic. I am sure that there will be plenty of food, but it is better if we have an idea about how many will be attending. Have fun!

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COMET EPHEMERIS

DATE (UT)	RA (1950)	DEC	RA (2000)	DEC	ELONG	SKY	MAG
			Comet Austin ($1989c_1$)				
06-23	15h42.2m	-34°01'	15h45.4m	-34°10'	148°	E	8.9
06-28	15h32.2m	-34°42'	15h35.4m	-34°52'	142°	E	9.4
07-03	15h25.7m	-35°09'	15h28.9m	-35°19'	135°	E	9.9
07-08	15h21.8m	-35°29'	15h24.9m	-35°40'	130°	E	10.3
07-13	15h19.7m	-35°45'	15h22.9m	-35°55'	125°	E	10.7
07-18	15h19.1m	-35°58'	15h22.3m	-36°09'	121°	E	11.0
07-23	15h19.7m	-36°10'	15h22.8m	-36°21'	116°	E	11.3
07-28	15h21.1m	-36°21'	15h24.3m	-36°32'	112°	E	11.6
08-02	15h23.3m	-36°32'	15h26.5m	-36°43'	108°	E	11.9
08-07	15h26.1m	-36°43'	15h29.3m	-36°54'	104°	E	12.2
08-12	15h29.4m	-36°55'	15h32.6m	-37°05'	100°	E	12.4
			Comet Levy (1990c)				
06-23	00h07.1m	+29°12'	00h09.6m	+29°29'	78°	M	9.2
06-28	00h07.2m	+29°24'	00h09.8m	+29°40'	82°	M	9.0
07-03	00h06.6m	+29°33'	00h09.1m	+29°49'	87°	M	8.8
07-08	00h05.0m	+29°38'	00h07.6m	+29°55'	91°	M	8.5
07-13	00h02.4m	+29°39'	00h05.0m	+29°56'	96°	M	8.2
07-18	23h58.9m	+29°33'	00h00.9m	+29°50'	101°	M	7.9
07-23	23h52.6m	+29°18'	23h55.1m	+29°34'	106°	M	7.6
07-28	23h44.6m	+28°48'	23h47.1m	+29°05'	112°	M	7.3
08-02	23h33.8m	+27°58'	23h36.2m	+28°14'	119°	M	6.9
08-07	23h19.2m	+26°37'	23h21.7m	+26°53'	126°	M	6.5
08-12	22h59.9m	+24°28'	23h02.3m	+24°44'	134°	M	6.1

THIS MONTH'S METEORS

SHOWER NAME	DATES	DATE OF MAXIMUM	MAXIMUM VISUAL ZENITHAL RATE (per Hr.)	RADIANT POINT (ON MAX DATE) R. A.	DEC	VELOCITY km/sec.	NOTES
Daytime Beta Taurids	June 24-July 6	June 29	30 (radar)	4h 8m	+19	30	daylight shower
July Phoenicids	July 3 - 18	July 14	30 (radar)	2h 4m	-47.9	47±3	southern shower possibly night
Omicron Draconids	July 7 - 24	July 16	<1	18h 4m	+59	23.6	very weak shr w/ very slow meteors
Northern Delta Aquarids	July 14-Aug. 25	Aug. 12	20	22h 36m	-5	42.3	visually sep. frm S. Delta Aqu'ids
Southern Delta Aquarids	July 21-Aug. 29	July 29	30	22h 12m	-16.5	41.4	w/ Alpha Cap'ids & S. Iota Aqu'ids
Alpha Capricornids	July 15-Aug. 10	July 30	30	20h 28m	-10	22.8	w/ S. Delta Aqu'ids very slow, bright
Southern Iota Aquarids	July 15-Aug. 25	Aug. 5	15	22h 13m	-14.7	33.8	w/ S. Delta Aqu'ids slow, long paths
Northern Iota Aquarids	July 15-Sept. 20	Aug. 20	15	21h 48m	-6	31.2	long duration shr slow, long paths
Perseids	July 23-Aug. 23	Aug. 12	70	3h 5m	+57.4	59.4	swift, w/ trains usu. org or yellow

EPHEMERIS is published monthly by the San Jose Astronomical Association - 3509 Calico Ave., San Jose California 95124. Members are encouraged to submit articles for publication. These should be typed and submitted no later than the 12th of the previous month. All submissions should be sent directly to the Editor, John P. Gleason, 5361 Port Sailwood Dr. Newark, California 94560 415-792-8248

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