

THE EYE (Continued)

Small clusters of dead cells floating within the humors may sometimes be seen as fuzzy spots called VITREOUS OPACITIES. Learn to recognize and ignore them, and, Dr. Byrnes advises, when you see them in a telescope, DON'T call them something else! They can usually be seen against a light field (e.g. the day sky), and they respond both to gravity and to eye motion.

The so-called OPTIC NERVE, really an extension of the brain, is attached to the rear wall of the eyeball, where it is covered by the light-sensitive RETINA, in a position corresponding to that of the film in a camera. The sensation of VISION is the combined result of two separate inputs to the brain. One is from the eyes, the other from the brain itself (memory). Often very difficult to separate, the different natures of these two inputs must be recognized for intelligent observing.

The RETINA comprises elements sensitive to wavelength, or COLOR, called CONES, and elements sensitive to intensity only, called RODS. The MACULA, which is the central area of greatest acuity, is covered by cones. In order to perceive that two closely spaced points are separate, at least one unstimulated cone must lie between the two images on the retina. The rods are distributed on the periphery of the retina.

DARK ADAPTATION of the cones takes place in about eight minutes, when the threshold of sensitivity becomes about 6.3×10^{-12} Lamberts, about the value of full moonlight. Color perception fails at lower illumination, but the rods, although they require about a half-hour for adaptation, become sensitive to one thousandth of this level. While the cones are sensitive to WAVELENGTHS ranging from 400 to 700 m μ , the rods are sensitive only from about 400 to 600 m μ , so red light does not destroy their (peripheral) dark adaptation.

FLICKER and MOTION are far more easily perceived in the peripheral region, but with poor acuity and color sensitivity. The eye is sensitive to objects of lower brightness if larger or moving.

Sometimes a most sensitive spot may be found, perhaps ten degrees from the macula, either above, below, or to one side.

PUPILLARY ADAPTATION, which takes place rather quickly when the light level is changed, adjusts the light over a range of about 50:1. TOTAL RANGE is about 1,000,000:1, mainly through RETINAL ADAPTATION.

Lightly cover observing eye while reading charts. Remember, too, that light in the outside eye can contract the pupil in the telescope eye.

The retina consumes more oxygen than any other organ; its sensitivity is drastically reduced at 15,000 feet, where oxygen is necessary for best seeing. Sensitivity of the retina also DECREASES WITH AGE to about 50% for each 12 years.

The retina will adapt to a continued stationary light pattern, making the pattern invisible. Move the eyes occasionally. Try to confirm impressions whenever possible, to avoid input errors. Recognize after-images to avoid confusion. Retinal blood vessels are sometimes made visible by a moving point source near the eye. Excessive exposure to bright daylight before observing increases adaptation time. Use a 15% neutral density filter to prevent this. The retina does not fatigue, but other apparatus does.

Sensitivity of the retina is reduced by SMOKING or PHYSICAL FATIGUE. ALCOHOL decreases sensitivity of both the eye and brain cells. CAFFEINE does not increase sensitivity, but may stimulate the brain. Supplemental VITAMIN A helps only if there is a deficiency; then only after about six months of treatment.

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January 1958

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HEYDEN TO TALK TO NCA ON MILKY WAY STAR COUNT



Father Heyden

Francis J. Heyden, S. J., Director of the Georgetown University Observatory, will speak to the NCA on January fourth on STAR COUNTS IN THE MILKY WAY. He will discuss some of the fundamentals of statistical astronomy, a branch of research somewhat neglected in the literature. In his four-part talk, Father Heyden will cover basic theory, appraisal of results, new techniques for counting, and the use and contribution of data gathered by the new techniques.

Father Heyden will describe a technique now being developed by one of his graduate students. This is a device which, by scanning, recognizes sizes and shapes of images on star plates, yielding separate counts of stars and galaxies according to magnitude. Visual counting has been one of the most laborious tasks undertaken by the astronomer.

Father Heyden has spoken to the NCA on previous occasions and his work is well known to the NCA. For several years, he was on the staff of the Manila Observatory. He received his PH. D. in astronomy from Harvard during the Second World War. Among the activities for which he is best known are the eclipse expeditions which he has led and his work in photographing the Southern Milky Way. At Georgetown his chief work is developing new methods of timing solar eclipses. He is also working with the Air Force on astronomical research.

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MORE SATELLITE OBSERVATIONS

Moonwatch teams in the Washington area succeeded in obtaining a series of observations of OC1 before it came to earth. It crossed the meridian at E. P. G. at an altitude of 65° N. (6:02 P.M.) November 24, and was watched until it reached an altitude of 10° in the southeast. This passage occurred one day sooner than Cambridge had predicted. On the next day the orbit had moved so much that at 6:17 P. M. OC1 crossed at 15° South. The December issue of STAR DUST reported observations of OC1 and OC2 on those days, and some on the 26th, when OC1 was seen very low in the southwest at 6:25 P.M. Considering the low elevation of the rocket and the long period from sunset it is surprising that the shadow of the earth did not interfere.

Moonwatch teams started looking for β in the morning sky about the 10th of December. On the 12th the temperature at E. P. G. was eight degrees and moonlight was reflected from the telescope mirrors, making last-minute adjustments difficult. The rocket passed by unobserved that morning. It was seen, however, by Lyle Johnson and Steve Nagy, of E. R. D. L., who said that it crossed by the Zenith at 5:57 A. M. Beta crossed at 79° (5:27 A. M.) on the 14th, and was observed for a period of eight minutes, its brightness fluctuating periodically. This is the first case when the apparent motion of the orbit has been to the north-east.

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MORE SATELLITE OBSERVATIONS (Cont'd. from page 1)

On the 15th, Alan Bradford observed δ transit the moon. He followed with binoculars the satellite's passage near the top edge of the moon. The time was 5:00 A. M. and the moon's position was right ascension $12^h 16^m$, declination $-4^{\circ} 55'$.

Other observations were made on the 15th and 16th, and more are expected during December.

A. L. White, Astronomy Editor

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JANUARY CALENDAR

JANUARY 4 (Saturday) - Lecture Series: "STAR COUNTS IN THE MILKY WAY" Francis J. Heyden, S. J., 8:15 P. M., Dept. of Commerce Auditorium, 15th and E Streets, N. W. The public is welcome.

JANUARY 11 (Saturday) - Maryland and D. C. Juniors over 12 meet with Leith Holloway at 2:00 P. M. at the Chevy Chase Community Center, 5601 Connecticut Avenue, N.W. Discussion Topic: "Relativity." Call Leith at LU 1-8334 for details.

JANUARY 18 (Saturday) - Discussion Group: "Celestial Photography," led by Everette Neville, 8:00 P. M. in the Foyer of the Commerce Auditorium.

JANUARY 19 (Sunday) - Group Observing at the NCA 5" Refractor, starting at 7:30 P. M., followed by IGY group meteor observation. The group will be organized and instructed by Mr. Isherwood, and will use the standard IGY report form. Regular observers are desired for meteor showers and IGY world days. Your NCA membership card will admit you to the Observatory grounds.

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CONTINUING ACTIVITIES

EACH MONDAY NIGHT, the telescope making class meets with Hoy Walls at 7:30 P. M. at the Chevy Chase Community Center.

EACH WEDNESDAY NIGHT (except January 1), the Virginia Juniors over 12 meet with Bob Brown at Falls Church High School for discussions of astronomy, optics, and telescope making, at 7:30 P. M.

At their December 18 meeting, Bob's group previewed the program for the coming year with enthusiasm. Slides were also enjoyed.

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NCA GROWS

The NCA cordially welcomes the following people, who were elected to membership December 7, 1957:

REGULAR

Mr. and Mrs. Donald G. Boegehold, 1104 So. Cleveland,
Arlington, Va. JA 7-3792
Hugh M. Fitzpatrick, 4805 Montgomery Ave., Glen Cove 16, Md.
OL 2-6515
Joseph W. Kappel, 12315 Bluhill Rd., Silver Spring, Md. WH 2-9270
Paul Risinger, 10420 Hayes Ave., Silver Spring, Md. LO 4-8095

JUNIOR

Robert W. Milkey, 5523 Lincoln St., Bethesda, Md. OL 4-3179

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Four million tons of solar mass is converted to energy each second.

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OBSERVATIONAL DATA FOR JANUARY

MERCURY is a morning star in January and reaches greatest western elongation on the 15th. Venus is visible in the southwest after sunset until January 28, when it is in conjunction with the sun. MARS is in Scorpius and may be seen in the southwest for several hours before sunrise. JUPITER is in Virgo, and rises an hour after midnight. SATURN is in Ophiuchus, and rises in the southeast two hours before the sun.

The date of maximum intensity for the QUADRANTID meteor shower is January 3. This shower averages 20 meteors per hour, and the position of the radiant is $\alpha 231^{\circ}$; $\delta +50^{\circ}$.

On the 15th at 2300 (E.S.T.), the milky way spans the heavens from north to south, passing through Cassiopeia, Persius, Auriga, and Monoceros.

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LUNAR OCCULTATIONS FOR JANUARY

DATE	STAR	MAG.	AGE	PHASE	TIME (E.S.T.)	P
Jan. 2, 1958	234 B. Tau.	6.0	12.8	D	7:28.0 P. M.	16 ^o
Jan. 2, 1958	Epsilon Tau.	3.6	12.9	D	9:45.7 P. M.	21 ^o
Jan. 7-8, 1958	Omega Leo m	5.5	18.1	R	3:35.8 A. M.	263 ^o
Jan. 29, 1958	163 B Tau.	5.8	10.1	D	6:28.0 P. M.	43 ^o

A. L. White, Astronomy Editor

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OBSERVING AIDS AVAILABLE

The 1958 editions of the GRAPHIC TIMETABLE OF THE HEAVENS and the Canadian OBSERVER'S HANDBOOK are now available, and may be procured from the Treasurer at the January meeting.

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Satellite 1957 ρ is expected to be next seen here late in January.

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MORE TO THE EYE THAN GREET'S IT, DR. BYRNES POINTS OUT

Dr. Victor A. Byrnes, Aviation ophthalmologist, Brigadier General, and Director of Professional Services for the Surgeon General of the Air Force, provided a unique educational treat for the NCA in his talk on the eye in December. Clearly illustrated by color slides, his presentation included so much important information that it was decided to list briefly for reference as many points as could be covered here.

The LENS of the eye, unique in that it is focused by changing its curvature rather than its position, has a focal length of about 17 mm., corresponding to 58 diopters. The ability to focus at close range, or ACCOMMODATION, decreases with age. Mechanism can be severely FATIGUED by focussing telescope to require too great an accommodation. Looking into an empty field, the eye focuses at about one meter, not infinity. This condition, NIGHT MYOPIA, can cause Air Force pilots to fail to see distant planes, or astronomers to miss satellites. Whenever possible, have stars or other objects in field at proper distance. A single point source in the field may seem to move about. This AUTO KINETIC phenomena can also be prevented by having other objects in the field. Moving the eyes occasionally also helps.

Under certain conditions, the LENS FIBERS can act as a DIFFRACTION GRATING. TEARS on CORNEA can also be troublesome. (Move lids occasionally.)

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