★ STAR DUST

Volume XXXV March 1979 Number 7

MARCH CALENDAR — *The public is welcome.*

Friday, March 2, 9, 16, 23, 30, 7:30 PM — Telescope-making classes at American University, McKinley Hall basement. Information: Jerry Schnall, 362-8872.

Saturday, March 3, 6:15 PM — Dinner with the speaker at the Thai Room II, 527 13th Street, NW. Reservations unnecessary.

Saturday, March 3, 8:15 PM — NCA monthly meeting at the Department of Commerce Auditorium, 14th and E streets, NW. At presstime, *Star Dust* has received no information on the program, this month perhaps because of the severe weather.

Monday, March 5, 12, 19, 26, 7:30 PM — Telescope-making classes at the Chevy Chase Community Center, Connecticut Avenue and McKinley Street, NW. Information: Jerry Schnall, 362-8872.

FEBRUARY LECTURE

Dr. John A. O'Keefe of the Laboratory for Astronomy and Solar Physics, Goddard Space Flight Center, spoke on the very controversial topic of tektite origins at the February 3 meeting of National Capital Astronomers.

Tektites are black, glassy stones varying widely in size, found exclusively in a number of large, well-defined regions of the world. One of these is in the southern United States, another in western Australia, and a third contains Czechoslovakia.

A minority of tektites, like the one found in the ruins of a Cambodian temple in 1927, show no signs of overall stress and appear to be composed of layers of microtektites. Most tektites, however, are of the splashform variety; round, dishlike, showing evidence of cracking followed by corrosion. They usually contain a central, mirror-surfaced bubble showing that these were formed under conditions of weak stress. Often similar in appearance to obsidian, tektites show a cross section of welded bits, unlike terrestrial sandstone, which is also very rich in silicas.

Tektites show variations in chemical composition such that the major region on Earth from which one came can be identified by its chemical analysis.

Relative to granite, tektites contain more metallic elements and fewer alkalies. Although they are high in silicates, they are less granite-like than terrestrial rocks high in silicates. In composition they lie between granites and basalts, especially in metal content, but have fewer volatiles than both. Tektites are radically different from meteorites in composition, having 70 percent SiO_2 compared to 40 to 50 percent for the latter. Tektites are acidic overall while meteorites are ultrabasic. Compared to terrestrial rocks, tektites are deficient in water by 50 percent.

Apparently only about 0.1 percent of the lunar surface has a composition

similar to that of tektites, although both are relatively low in elements in the right side of the periodic table.

During the 19th century some tektites were thought to be ancient glass because many were found near a Czech site of ancient glassmaking. This idea was abandoned when it was seen that the most modern methods of 1900 could barely melt tektites, so the ancients could not have.

Streit (1898) found flanges on west Australian tektites, suggesting they penetrated the atmosphere at high speeds. Stinson (1933) suggested that tektites were produced on Earth by meteorite impacts, while Susett argued for a direct cosmic origin.

The most recent tektite fall, found by potassium isotope dating to be 750,000 years old, lies in western Australia. They each reveal a front surface pattern of ring waves and have a flange at the back, suggestive of being caused by a high-speed airstream while heated. In the early 1960's, Dean Chapman at Ames Research Center duplicated this effect in a wind tunnel, applying space-craft ablation heatshield formulas to the heating observed. The results imply that these tektites reached speeds of 15 to 30 km per second, much faster than possible from a terrestrial volcanic source or meteorite impact displacement on Earth, yet slower than the 44 km per second minimum that an object from a cosmic source would have. Independent of total ablation considerations, the ring pattern found in the Australian tektites gives information on their velocity and angle of descent.

Tektites lack the cosmic-ray tracks of isotopes ^{26}Al, ^{10}Al, and ^{10}Ne shown by objects that have long wandered in cosmic space. Further, the narrow regions in which tektite falls have occurred clearly did not result from a diffuse cloud. Thus, only a terrestrial or lunar source seems probable.

The nature of tektites as now known suggests that their origin is either terrestrial or lunar, and that the mechanism of their production is either impact or volcanism.

Terrestrial meteorite impact can propel excavated matter at velocities of up to 0.75 km per second; tektites show evidence of ablation at much greater velocities. The chemical composition of tektites is quite dissimilar to those of terrestrial rocks. Also, thermal transformation of the inhomogeneous rocks into tektites would require far more time than the impact mechanism would allow. Terrestrial impact seems unlikely to generate tektites.

Terrestrial volcanism cannot account for the distances from volcanoes at which tektites are found — much farther than volcanoes could propel them through the atmosphere. Terrestrial volcanism seems not to explain tektites.

Lunar meteorite impact could produce the velocity necessary for escape from the Moon; atmospheric entry could produce the required heating. Impacts, however, would excavate the surface material impartially, while only a fraction of lunar rocks resemble tektites chemically. Lunar impact cannot account for the chemical composition of tektites.

Lunar volcanoes, propelled by hydrogen, not water, could expel matter at the 2.5-km-per-second velocity necessary to escape the Moon. Some indications (gaseous emissions) have been detected of current lunar volcanism. A volcano at low selenographic latitude near 90° E could propel matter into an Earth-intercept trajectory. The 70 percent silicon content of tektites resembles that of lunar and terrestrial volcanic rocks.

Having presented the above arguments, O'Keefe pointed to lunar volcanism as the most probable source of tektites.

That tektites may be produced by lunar volcanism is significant also for the new ideas it may bring to planetology, O'Keefe said in conclusion, for far-reaching changes are required in concepts of planetary function, origin, and structure if volcanism finds a larger role in theory than at present. wrw

TELESCOPE FUND GROWING; YOUR CONTRIBUTION NEEDED

The NCA 14-inch Celestron telescope has been ordered, along with a fine list of accessories to enhance its flexibility and utility. The treasurer reports a gratifying response from the membership, some making substantial donations. Of course, full participation is desirable; several dollars from each member with a few larger contributions would do the job. Your contribution is needed to assure timely delivery. Here is an opportunity to have available for your use a fine facility for a very small investment.

Make contributions payable to National Capital Astronomers, and address them to the treasurer, Dr. Robert M. Lynn, 7320 Baylor Avenue, College Park, MD 20740. Or, hand them to him at the next NCA meeting.

NOMINATING COMMITTEE APPOINTED

President James Trexler has appointed the following nominating committee:

James H. Trexler (ex officio)
Benson Jay Simon
G. Robert Wright
Henning Leidecker
Robert H. McCracken

The committee is to offer in April a slate of candidates for NCA offices for fiscal 1980, for the annual election on May 5. Other nominations may be made by written petition of ten full members in good standing, submitted to the trustees prior to the May 5 election.

GRAZING OCCULTATION EXPEDITIONS PLANNED

Dr. David Dunham is organizing observers for the following grazing lunar occultations in March. For further information, call Dave at 585-0989.

UT Date	UT Time	Place	Vis Mag	Pcnt Sunlit	Cusp Angle	Min Aper
03-04-79	23:47	Whitakers, NC	3.9	43	2S	3 cm
03-05-79	05:17	Dixon, CA	1.1	47	6N	3 cm
03-07-79	04:23	Ashland, VA	6.4	64	7N	5 cm
03-08-79	01:30	Eldersburg, MD	7.1	72	3N	15 cm
03-19-79	05:40	Clinton, MD	8.3	73	8S	20 cm
03-30-79	00:49	Midlothian, VA	5.7	5	3S	5 cm

LUNAR HYADES PASSAGE MARCH 4, MANY LOCAL TOTAL OCCULTATIONS

Throughout the evening of March 4, the Moon will traverse the Hyades cluster, offering an opportunity to time many total occultations in the Washington area. The following are all brighter than 7th magnitude:

UT Date	UT Time	Star (ZC)	Vis Mag	Pcnt Sunlit	Cusp Angle	Min Aper
03-04-79	23:23	0635	3.9	43	36S	3 cm
03-05-79	02:54	0659 (doub)	6.4	44	73S	5 cm
03-05-79	04:24	0669	4.0	45	69S	3 cm
03-05-79	04:32	0671	3.6	45	45S	3 cm
03-05-79	04:40	0672 (doub)	6.6	45	67N	5 cm
03-35-79	05:24	0677	4.8	45	61N	5 cm

For further information on occultations, call Dr. David Dunham at 585-0989.

Dr. Dunham is president of the International Occultation Timing Association (IOTA).

EXCERPTS FROM THE IAU CIRCULARS

1. January 15 — Kaluzienski and Holt, Goddard Space Flight Center, detected an X-ray flare from Circinus X-1 with the Ariel-5 all-sky monitor. The source intensified by an order of magnitude, declined to its original level, and then intensified again.

2. January 25 — G. N. Kimeride, Abastumani Observatory, discovered a supernova of magnitude 15 in the galaxy NGC 4647.

3. January 27 — C. T. Kowal, Hale Observatories, discovered a comet (1979a) of 17th magnitude in Cetus with the Palomar 122-cm Schmidt telescope.

4. January — Thuan and Martin, University of Virginia, reported observations of the new local-group dwarf galaxies at 21 cm with the Arecibo antenna. Only LGS-3 was detected. The radial velocity found (-280 km per sec) and its resolution into stars on the Palomar Sky Survey confirm it to be a new member of the local group.

FIRST CLASS MAIL

* STAR DUST

WASHINGTON, D. C.

Published eleven times yearly for NATIONAL CAPITAL ASTRONOMERS, INCORPORATED, a non-profit, public-service organization promoting interest and education in astronomy and related sciences. President, James H. Trexler. *Star Dust*: Robert H. McCracken, 5120 Newport Avenue, Washington, DC 20016. Deadline: 15th of preceding month.