

★ S T A R D U S T



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LESH TO SURVEY SPECTRAL CLASSIFICATION SYSTEM



DR. LESH

Dr. Janet Rountree Lesh, Goddard Space Flight Center, will speak at the June 2 meeting of National Capital Astronomers, on the history and status of stellar spectral classification.

Dr. Lesh will discuss the work of pioneers in the field, the background of the M-K system, current problems of classification, and the expected evolution of methods based on current research.

Janet Rountree Lesh received the B.S. in astronomy from Cornell University, winning honors in English at the same time. As a Fulbright Scholar, she studied astrophysics for two years at the Sorbonne in France. Later she obtained the Ph. D. at the University of Chicago, studying there under W. W. Morgan, known as the originator of the M-K system.

Prior to coming to NASA, Dr. Lesh has been on the staffs of observatories at Leyden and Paris, and a National Academy of Sciences Fellow at the University of Denver. She retains her affiliation with the Denver institution.

JUNE CALENDAR — *The public is welcome.*

Friday, June 1, 8, 15, 22, 29, 7:30 PM — Telescope-making classes at American University, McKinley Hall basement. Information: Jerry Schnall, 362-8872.

Saturday, June 2, 6:15 PM — Dinner with the speaker at the Thai Room II, 527 13th Street, NW. Reservations unnecessary.

Saturday, June 2, 8:15 PM — NCA monthly meeting at the Department of Commerce Auditorium, 14th and E streets, NW. Dr. Janet Lesh will speak.

Monday, June 4, 11, 18, 25, 7:30 PM — Telescope-making classes at the Chevy Chase Community Center, Connecticut Avenue and McKinley Street, NW. Information: Jerry Schnall, 362-8862.

Saturday, June 16, 9:00 PM — *Exploring the Sky*, presented jointly by NCA and the National Park Service. Glover Road south of Military Road, NW, near Rock Creek Nature Center. Planetarium if cloudy. Information: Bob McCracken, 229-8321.

Saturday, June 23, 8:00 PM — Observing session at Fort Washington Park. See page 39 for details. (Members and guests.)

MAY LECTURE

Dr. Paul D. Lowman, Goddard Space Flight Center, described recent discoveries in planetary evolution resulting from the Apollo, Mariner, and Voyager missions, at the May 5 meeting of National Capital Astronomers.

Dr. Lowman discussed the impact of the recent findings on comparative planetology, particularly, new insight into the crustal evolution of the terrestrial planets. Because silicon is far more abundant on the surfaces of differentiated planets, Lowman characterized the differentiated, terrestrial planets as silicate planets, and included the Moon.

Comparison of the terrestrial planets shows striking differences; the new data also reveal similarities, however, which yield new understanding of the crustal evolution of the planets, and largely explain the differences.

Comparison of the inner solar system with the Galilean satellite system of Jupiter also shows striking differences. Except for having insufficient mass, Jupiter might have become a star. Lowman also showed some parallels between the Jovian satellites and the silicate planets and offered some interpretations.

Differences among the silicate planets do not reflect different evolutionary mechanisms, Lowman says, but rather indicate the different stages reached by each in parallel evolutionary paths. He delineated four major stages of planetary evolution: 1, Formation through a high-temperature process; 2a, Formation of a global crust through the first chemical differentiation; 2b, Late heavy bombardment by massive objects over a short interval about 3.9 billion years ago, which formed the maria basins and smaller craters; 3, Second differentiation by the eruption of magma from the partially melted interior, which filled the lowlands; 4, Plate tectonics.

Since the Moon appears to be a reasonably representative prototype of the silicate planets, Lowman illustrated by tracing the lunar data through the three stages of evolution reached by the Moon.

The aluminum:silicon ratio on the lunar surface was measured from the Apollo 15 and 16 Command Modules, by detecting secondary X-ray emission from the Moon, stimulated by solar irradiation. The maria are found to be systematically low in aluminum, the highlands rich in aluminum. Anorthosite is abundant in the highlands. It is chiefly feldspar, or aluminum silicate. The highlands are the global crust of the first differentiation, while the lowlands have been overlain with iron-rich basaltic magma from the second differentiation, a process which lasted almost a billion years. Some continuing bombardment formed the newer craters.

The Moon thus evolved through stage 3 in an evolutionary sequence common to the silicate planets.

Mercury superficially resembles the Moon, but is the densest body in the solar system if allowance is made for compression. (With gravitational compression, the Earth is somewhat denser.) Mercury's crustal evolution appears to have paralleled that of the Moon. Highlands of crustal material formed in the first differentiation, basins such as Mare Caloris, formed by the late heavy bombardment, all are consistent with the same evolutionary sequence.

Mariner 9 infrared spectrometry of the Martian surface shows absorption features of quartz, and of high silica content in the dust, indicating the crust of a differentiated planet. The spectrum resembles that taken by satellite of the desert areas of North Africa. As predicted by Ponnampерuma, University of Maryland, super oxides are abundant on the Martian surface, a result of the long-term solar ultraviolet irradiation, little attenuated by the tenuous atmosphere.

The presence of cratered highlands, large mare basins, and volcanoes, all are consistent with the same crustal evolutionary sequence. On Mars, however, a large rift valley signals the beginning of plate tectonics; Mars apparently entered stage 4.

While less is known of Venus, radar surveys of the planet show a cratered

NEW NCA OFFICERS ELECTED

At the annual business meeting on May 5, NCA elected the following officers for fiscal 1980:

| | |
|--------------------------|-------------------|
| President | Mary Ellen Simon |
| Vice President | Wolfgang Schubert |
| Secretary | Sharon Edmonds |
| Treasurer | Robert Lynn |
| Trustee (Four-year term) | James Trexler |
| Sergeant at Arms | Charles Edmonds |

NCA Thanks the retiring officers for their service.

GRAZING OCCULTATION EXPEDITIONS PLANNED

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

| UT Date | Place Time | Vis Mag | Pcnt Sunlit | Cusp Angle | Min Aper |
|----------------|-----------------|------------|----------------|---------------|-------------|
| 06-03-79 05:04 | Nottingham, MD | 8.3 | 52 | 1S | 15 cm |
| 06-07-79 06:29 | Mount Olive, NC | 4.3 | 87 | 5S | 5 cm |

NCA OBSERVING SESSION SCHEDULED AT FORT WASHINGTON PARK

National Capital Astronomers will have an observing session at Fort Washington Park on Saturday, June 23, from 8:00 PM until midnight. Please arrive at the park entrance before the gate is closed at 9:00 PM. Bring telescopes. No picnic is scheduled.

From Beltway exit 37, go south on Indian Head Highway (Maryland 210) 4.1 miles to Fort Washington Road. Turn right and continue 3.3 miles to the park gate. Assemble at Flagpole Area, straight ahead through the gate.

surface and apparently tektonically formed features. A forked valley 1,100 km long may indicate that Venus evolved into the 4th stage.

The degree of crustal evolution of the terrestrial, or silicate, planets is in order of increasing mass: Moon, Mercury, Mars, Venus, Earth.

The outer planets are quite different, generally larger, less dense, and composed chiefly of volatiles. Jupiter is the largest and most massive body in the solar system. Composed mainly of molten metallic hydrogen, Jupiter, except for insufficient mass, might have become a star.

Comparing the Jovian satellite system to the inner solar system, Lowman pointed out, with much recent supportive evidence, some similarities as well as differences.

Io is perturbed into an orbital eccentricity by Europa, resulting in heating by gravitational flexure and active volcanism. Its reddish color perhaps is molten volcanic sulphur. Io spreads a torus of ionized sulphur around its orbit. Blue areas in the photographs, if real, may indicate lapis lazuli, a sulphur silicate, Lowman speculates. Silicon may indicate a differentiated crust.

Europa appears to be rather highly evolved, showing scars not erased by heavy cratering. Voyager II will photograph Europa closely about July 9.

Ganymede has a very low density, indicating mainly water ice.

Callisto is also a low-density satellite, mainly of water ice. Its crater-saturated surface is largely healed by ice flow.

The degree of evolution of the Jovian satellites, Lowman said, also appears to be in order of increasing mass.

rhm

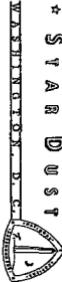
EXCERPTS FROM THE IAU CIRCULARS

1. April 19 — Gus E. Johnson, Swanton, Maryland, discovered a supernova of 12th magnitude in NCA 4321 (M100). Asiago Astrophysical and McGraw-Hill Observatories found the spectrum to be featureless on April 21, suggesting a type-II supernova, possibly still approaching maximum. UV spectra were obtained with the IUE from April 22 to May 7 showing some C, Si, and N lines indicating an expansion velocity of 3,900 km per sec. University of Texas photometry indicates that the maximum was reached a week after discovery.

2. April 30 — N. Voigt, European Southern Observatory, discovered that short-period nova OY Carinae is also an eclipsing binary. Three eclipses 1.5 hours apart were observed on April 30, and two on May 1.

3. May 13 — Kaluzienski and Holt, Goddard Space Flight Center, detected an X-ray outburst in Centaurus with the Ariel 5 all-sky monitor. It is believed to be from Cen X-4, a transient source last observed in July 1969. rnb

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 a non-profit, public-service organization pro-
 moting interest and education in astronomy and
 related sciences. President, James H. Trexler. Star Date: Robert H. McCracken,
 5120 Newport Avenue, Washington, DC 20016. Deadline: 15th of preceding month.