☆ STAR DUST

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YOUNG: VIKING AND THE MARTIAN SCENE

DR. YOUNG

Dr. Richard S. Young, Chief, Planetary Biology and Quarantine, Office of Space Science, NASA, will address the December 4 meeting of National Capital Astronomers on the results of the Mars Viking mission to date.

The phenomenally successful Viking project comprises two orbiters and two landers which are presently sending back data from the surface and from orbit. All spacecraft are functioning normally and very productively. The orbital pictures are providing an unprecedented perspective of the extremely heterogeneous face of mars. Simultaneously, thermal mapping and water vapor distribution studies are being done. The landers are about 4,000 km apart on the surface in somewhat similar settings and are performing identical sets of experiments. The chemical and physical properties of the surface material are under study, including both organic and inorganic analyses as well as seismometry. The landers also include meteorological sensors and imaging systems. A device to analyze the surface material for evidence of biological activity is also included. Dr. Young will discuss the results of the Viking mission to date.

Richard S. Young was born in Southampton, New York. He received his B.A. from Gettysburg College in Pennsylvania and his Ph.D. from Florida State University in 1955. He worked in cancer research at Lederle Labs, Inc., later with the Federal Food and Drug Administration, then in astrobiology with the Army Ballistic Missile Agency at Huntsville, Alabama. In 1960 he became Chief of Flight Biology in the Office of Life Science Programs, NASA Headquarters, Washington, D. C.

From 1961 to 1967, as Chief of the Exobiology Division of Ames Research Center, Dr. Young was responsible for research in the areas of detection and origin of extraterrestrial life. He is currently Chief of the Planetary Biology Program and Chief Scientist for Viking. He has authored numerous papers and two books on extraterrestrial biology.

DECEMBER CALENDAR — *The public is welcome.*

Friday, December 3, 10, 17, 7:30 PM — Telescope-making classes at American University, McKinley Hall basement. Information: Jerry Schnall, 362-8872.

Saturday, December 4, 6:15 PM — Dinner with the speaker at Bassin's Restaurant, 14th Street and Pennsylvania Avenue, NW. Reservations unnecessary.

Saturday, December 4, 8:15 PM — NCA monthly meeting at the Department of Commerce Auditorium, 14th and E Streets, NW. Dr. R. S. Young speaks.

Monday, December 6, 13, 20, 27, 7:15 PM — Telescope-making classes at the Chevy Chase Community Center, Connecticut Avenue and McKinley Streets, NW. Information: Jerry Schnall. 362-8872.

NOVEMBER LECTURE

At the November 6 meeting of NCA, Dr. Robert S. Harrington of the exploratory Development Staff, U. S. Naval Observatory, presented his dynamical analysis of Dr. Thomas Van Flandern's conjecture that the planet Mercury may be an escaped satellite of Venus.

The possibility was first suggested by an apparent cratering asymmetry shown by the Mercury Mariner fly-by, which perhaps indicates early planetary shielding as of a satellite in synchronous rotation. Furthermore, Venus is almost without rotation, having a period of approximately 40 days, as though its rotational energy may have been lost to a former satellite through tidal friction.

As tidal friction transfers rotational to revolutionary energy the lengthening orbital radius increases the relative solar influence until, if there is sufficient rotational energy in the system, the satellite escapes into solar orbit through one of the two (Lagrangian) points of gravitational equilibrium on each side of the planet along the Sun line. If there were either no rotation or no third body (the Sun) there would be no escape.

Harrington's dynamical computer simulations show through numerical integration that if Mercury had been a satellite of Venus, it would have escaped. He also has shown that the subsequent solar orbit would be independent of the initial conditions. For escape through the inside point (L_1), a 50-percent probability, the semimajor axis of Mercury's solar orbit would be 0.69 astronomical unit (au) for a Venusian orbit of 0.72 au, with some eccentricity to the orbit of Venus. Of course, escape through the outer Lagrangian point would have resulted in a larger orbit for Mercury than that of Venus.

Mercury's period of revolution about Venus immediately prior to escape would be about 40 days, about the same as Venus' rotational period.

Analysis of the interactions between Mercury and Venus on subsequent encounters indicates a long-period stability. Eccentricities result in libration rather than crossings of the orbits. But the semimajor axis of Mercury's orbit is now 0.38 au, not 0.69 au. The difference must be accounted for.

Slight but persistent light pressure and drag in the tenuous interplanetary medium both gradually reduce the mean orbital radius. Venus raises larger solar tides than Mercury, which would slowly move Venus outward.

Planetary perturbations also affect eccentricity and inclination. Their secular variations, already calculated, indicate violent changes in both e and i. If at some time e was 0.12, about half the present value, and i was about 0.7, the model analysis allows the present values to occur semicyclically. The e and i calculations show that these values did in fact occur only 850,000 years ago. Thus, planetary perturbations alone could alter the escape parameters to the present values.

Mercury's rotation has slowed from the apparently 40-day escape period to 59 days, and should eventually match it's period of revolution, now 88 days.

The model seems qualitatively consistent with the observations, although quantitatively not well known. The analysis indicates that *if* Mercury was a satellite of Venus, not only *could* it have escaped, but that it probably *would* have escaped and evolved to the present conditions.

Dr. Harrington's only assertion is that no dynamical contradiction of the idea has been found. He plans to examine other planetary relationships, particularly between Pluto and Neptune.

NORTH CAROLINA GRAZE EXPEDITION SUCCESSFUL

A grazing occultation of the 6.14-magnitude star, ZC1234 occurred on November 13 south of Goldsboro, North Carolina. Several NCA observers led by David Dunham obtained data under good conditions. This graze was particularly important in that it delineated the north Cassini region, a narrow strip unknown because it is never illuminated while librated toward the Earth.

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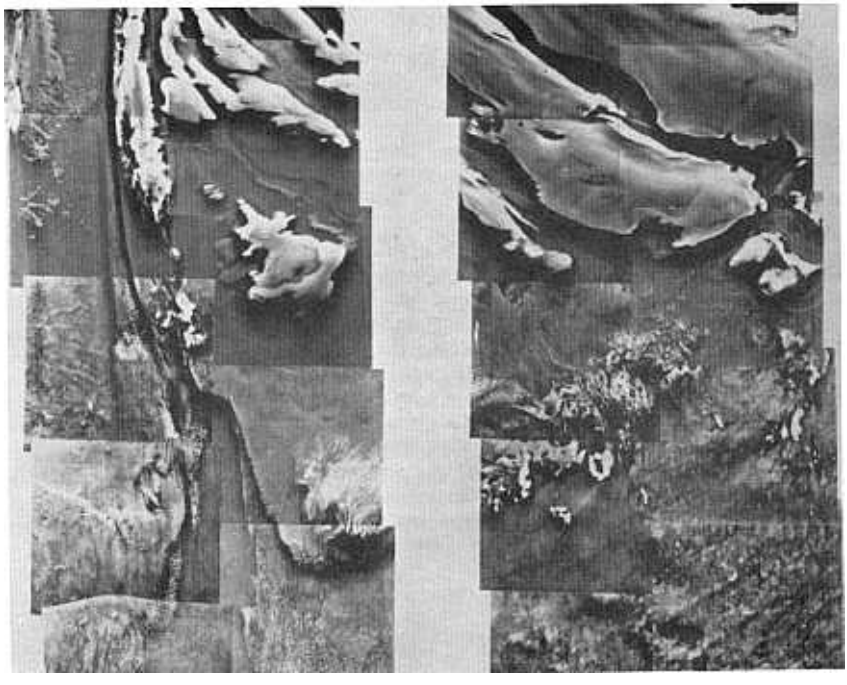

MARS POLAR TERRAIN RECORDS CLIMATIC CHANGES

The north polar ice cap of Mars, the layered deposits beneath it, and the dune fields surrounding it are shown in these two contiguous strips of Viking 2 pictures from NASA.

In the upper part of the scene flat, elongated patches of water ice are separated by ice-free terraced slopes. The terraces at left, evident as alternating light and dark bands, record cyclic climatic change. Mobile dark sand streams down a gently curving channel and accumulates in a broad delta-shaped dune field distinguished by a sinuous pattern of ridges. From there toward the lower right the solid mass of sand breaks down into a discontinuous skein of linear dunes.

Across the gap between the picture strips to the middle right, the surface is covered by mottled patches of ice. At the lower right the surface is obscured by haze and patchy cloud.

These picture mosaics provide a momentary glimpse of a continuing process in which polar caps and sand dunes shift, disappear, then reappear, driven by the powerful forces of climatic change.

NOVEMBER DISCUSSION GROUP SURVEYS OCCULTATIONS

Dr. David Dunham reviewed the status of the lunar occultation program at the November 20 discussion meeting. He described the usual observational techniques, equipment, some of the error sources, and a few of the pitfalls.

Considerable interest and some activity in photoelectric observation became apparent later in the discussion. The greatly superior timing and resolution of the photometer can yield diffraction details of the event, disclosing much information about the star or star system. Dr. Dunham points out, however, that for lunar positional data the advantage over visual occultation observations is reduced by the remaining error sources other than timing, e.g., uncertainty of star position and limited knowledge of the limb detail.

NCA has been active for many years in the occultation work. For further information contact Dr. David Dunham, 585-0989, or Walter Nissen, 528-6671.

EXCERPTS FROM THE IAU CIRCULARS

1. October — C. Y. Shao, Center for Astrophysics, determined the position of Nova Vulpeculae from a pair of exposures by McCrosky, and found at that place on the Palomar Sky Survey a blue star of magnitude 18.3.

2. October 24 — Kemp, Rudy, and Nolt, University of Oregon, measured the polarization of Nova Vulpeculae and deduced a distance of 1800 parsecs based on interstellar polarization.

3. October 27 — M. Baldwin, AAVSO, has determined the period of θ^1 Orionis A to be 65.43 days. Minima were observed on February 9, August 23, and October 27, and suspected on April 14.

4. November 8 — Klare and Wolf, Landessternwarte, Heidelberg-Konigstuhl, obtained spectra of Nova Vulpeculae showing broad, intense H and metallic emission lines. Strong, diffuse H absorption lines indicated an expansion velocity of 2000 km/s.

5. November 11 — C. A. Whitney, Harvard College Observatory, reported a decrease in the brightness of VV Cephei, indicating the beginning of an eclipse. Spear, Sonoma State College, predicts that second contact will occur on December 1 and mid-eclipse in August 1977.

6. December 31 — The Bureau International de l'Heure will insert a leap second into UTC at the end of the day. Thus, the last minute of 1976 will contain 61 seconds.

This listing courtesy R. N. Bolster.

WANTED

Dan Lewis (301) 881-1834, wants to obtain 6-inch, 7-inch, or 8-inch mirror blanks, plate glass or Pyrex, at any stage of grinding or polishing.

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