★ STAR DUST

Volume XXXI February 1975 Number 6

NASA SEARCHES PLANETS FOR ORIGIN OF LIFE

DR. YOUNG

"The origin and evolution of life is inextricably bound to the conditions of primitive planetary environments," says Dr. Richard S. Young, Chief of NASA's Planetary Biology Program and Chief Scientist for the Viking, 1975 Mars Lander Program. At the February 1 meeting of National Capital Astronomers, Dr. Young will describe NASA's search among the planets for clues to the beginning of life. He continues, "Planetary evolution may not be conducive to the origin of life; but if it is, and life begins, organisms will interact with, alter, and be altered by the planet's environment. NASA recognizes the intimate connection between the evolutions of life and planets and has made exobiology an integral element in its planetary programs. In a proper search for knowledge concerning extraterrestrial life and the origin of life, NASA must explore as many extraterrestrial bodies as possible in our solar system for the relevant information they can supply. In particular, the search should involve exploration of a continuum of planetary possibilities including bodies totally devoid of organic chemicals, those conceivably undergoing (or having undergone) organic chemical evolution and those possibly harboring life."

Dr. Young was born in Southampton, New York, received his B.A. degree from Gettysburg College in Pennsylvania in 1948, and his Ph.D. in Zoology from Florida State University in 1955. He was employed in cancer research at Lederle Labs, Inc. and later with the Federal Food and Drug Administration before 1958, when he began to work 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.

As Chief of the Exobiology Division at the Ames Research Center, from 1961 to 1967, Dr. Young had the responsibility for research in the areas pertinent to the detection and study of extraterrestrial life and the origin of life. He has published numerous research papers on studies pertinent to possible life on Mars and two books on extraterrestrial biology. He is currently Chief of the Planetary Biology Program and Chief Scientist for Viking, 1975 Mars Lander Program, NASA Headquarters.

FEBRUARY CALENDAR — *The public is welcome.*

Saturday, February 1, 6:15 PM — Dinner with the speaker at Bassin's Restaurant, 14th Street and Pennsylvania Avenue, NW. Reservations unnecessary.

Saturday, February 1, 8:15 PM — NCA monthly meeting at the Department of Commerce Auditorium, 14th and E Streets, NW. Dr. R. S. Young speaks.

Monday, February 3, 10, 17, 24, 7:30 PM — Telescope-making classes at Chevy Chase Community Center, Connecticut Avenue and McKinley Street, NW. Information: Jerry Schnall, 362-8872.

Friday, February 7, 14, 21, 28, 7:30 PM — Telescope-making classes at American University, Mckinley Hall Basement. Information: Jerry Schnall.

JANUARY LECTURE

Lunar Dust was Dr. Otto E. Berg's topic at the January 11 meeting of National Capital Astronomers. He discussed his LEAM (Lunar Ejecta and Meteorites) experiment on Apollo 17 that still reports from the Moon. The dust Berg is concerned with has a talcum-powder consistency and radii as small as 20 μm. LEAM sensors indicate the direction from which the 3.6 km/s grains strike and their speed, permitting inference of their origin — Moon, Sun, or meteorite.

Surprisingly, LEAM has not detected any lunar impacts of particles traveling less than .8 km/s. Nor have any particles of probable interstellar origin been detected. These must have velocities greater than 40 km/s. It has been determined that some of the particles striking LEAM were in solar orbit. The smallest of these, affected more by radiation pressure than by gravity, leave the solar system after their closest approach to the Sun.

LEAM results indicate that lunar soil is moved across the terminator by electrostatic levitation caused by the ionizing solar radiation on it. This motion is very small — less than one particle per square cm per lunation (28 days). Thus, millions of years will pass before man's footprints on the lunar surface are obliterated by this means.

Ejecta from the lunar surface have not been detected by the LEAM, but some below its speed detection threshold may occur. However, electrostatic levitation is probably the prime cause of soil movement.

In an extensive question-and-answer period, our speaker, a Goddard Space Flight Center scientist, said an important question now to be studied is the composition of particles detected on the Moon. Although large amounts of soil were returned on the suits of the astronauts of the six Apollo flights, this has not yet been widely distributed to experimenters.

An unusual feature of Dr. Berg's talk was his personal photographic record of the design and development of LEAM and of the astronauts' education in its use.

Following Dr. Berg's talk, two new astronomical education films were presented by Dr. Leidecker and Bob Wright. The first was an excellent computer-graphics simulation of the long-term changes in star groupings caused by their proper motions; the second film was a less well-done discussion of the nature of the Doppler effect.

NOTE ON CURRENT RESEARCH

The bright class B star X Persei is thought to be the optical counterpart of the X-ray source 2U0352+30. Studies of spectrograms taken between 1920 and 1974 suggest that it has a very massive companion — at least 30 times as massive as the Sun. The double-peaked emission lines show reversals at irregular intervals and the star as a whole varies by as much as .5 magnitude. Rotational velocities as given by the emission and absorption lines differ, and there is a slow variation, mostly in absorption-line values. A period of 575-595 days is indicated.

Four lines of evidence suggest that an unseen companion is orbiting X Persei:

1) Rotation-velocity variations have persisted for 30 cycles.

2) Largest velocity amplitudes derive from the absorption lines, which most likely indicate the motion of the underlying star.

3) Velocities derived from absorption and emission spectra are almost exactly out of phase.

4) The helium and Balmer absorption-line velocities are in phase but of different amplitudes. (*Astrophysical Journal*, August 1, 1974)

NASA DOWN TO EARTH

The National Aeronautics and Space Administration's spectacular cosmic exploits have seemingly overshadowed the resulting substantial benefits that are steadily infusing into our way of life almost unnoticed. Nearly every day, NASA releases describe horizon-bending space-technology contributions to our living standards, most of which seem to achieve less than their deserved press.

Six centers are operated for the transfer of space-developed technology to other uses. NASA sponsors courses, seminars, technology reviews, and publications, and develops both directly and through subsidies a remarkable range of applications for comfort, convenience, safety, education, entertainment, communication, transportation, ecology, health, longevity, security, nourishment, energy, international relations, ...

Four-year-old Jennifer Guarascio pauses to recharge her implanted heart pacemaker developed by Johns Hopkins Applied Physics Laboratory from NASA-designed components. NASA photo.

The space-connected origins of some developments are evident, of others not. Satellite technology alone has become an enormous field, already a vital part of our culture. World-wide communications, weather monitoring, timber management, large-area crop inventory, water resource management, surveying, oil and mineral exploration, are a few of the day-to-day functions of satellites. It is no longer possible for a major storm or hurricane to strike the United States undetected, thanks to continuous weather monitoring by satellites. A Miami NASA installation not only tracked Hurricane Carmen, but also warned and housed more than 7,000 refugees, 13 U. S. Navy vessels, and 75 small craft in the unique harbor facility. Besides making great strides in energy research, NASA has recently published a comprehensive energy bibliography, achieved nuclear-fission laser pumping, and is studying the effects on engines of oil from shale. They have refanned jet aircraft engines for reduced noise pollution and increased thrust, announced the first installation of flat electrical cable, developed for satellites, in private housing in New York, with several advantages, found new uses for lighter-than-air craft, rescued 4,000 members of the dwindling green sea-turtle population, and are predicting earthquakes in California by using radiations from quasars to detect minute Earth-crust adjustments. A digital computing cardiotachometer developed for monitoring astronauts is now in medical use. Their new solid-state data recorder has no moving parts, is far more reliable than magnetic tape, useful as aircraft flight data recorder or in an electronic control system for mass transit. Optical and electronic data (including image) processing have been developed to a high degree of sophistication. NASA is now selling satellite-launching services to many other nations.

Probably any technological theme copiously financed and eagerly pursued would yield its own assortment of incidental benefits; but to appraise the program solely on the merits of these fortuitous values is to ignore its primary objectives. Satellite technology *is* space technology. The great recent strides in, for example, meteorology are not incidental, fortuitous, or accidental; they are planned and hard-earned results in but one sector of a tremendous coordinated program in which planetary exploration is supportive. Planetary atmospheres differ markedly. Studies of the thus-separated effects facilitate design and interpretation of observations of the Earth's atmosphere in this new way.

The space program is the study of man's relation to his *total* planetary environment. Everywhere we see its fruits — whether we recognize them or not. Certainly it continues to be one of our best national investments!

EXCERPTS FROM THE IAU CIRCULARS

1. December — Jones, Graham, and Wielebinski, Max Planck Institut für Radio Astronomie, detected the binary pulsar at 1420 MHz with a 100-m telescope. The flux density was 0.2 Jy and the pulse width was less than 2ms.

2. December 16 — A 20-minute exposure with the 154-cm reflector by E. Roemer failed to show Comet Bennett (1974h), indicating that m_2 must have been fainter than 18. Other observers failed to detect the comet on November 29 and December 5, indicating that it was well below the expected brightness.

3. December 19 — Tokyo Astronomical Observatory reported a flare-up of Cyg X3. The flux density at 4.21 gHz was 4.7 Jy.

4. January 9 — Mullard Radio Astronomy Observatory reported another outburst by Cyg X3, reaching 5.5 Jy at 5 gHz.

This listing courtesy R. N. Bolster

* STAR DUST

Published eleven times yearly by NATIONAL CAPITAL ASTRONOMERS, INC., a non-profit, public-service organization for the promotion of interest and education in astronomy and the related sciences. President: Dr. Henning Leidecker, Washington, D. C. Star Dust production, William Winkler and Robert McCracken. Deadline: 15th of each month.

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