SPACE

Eight Planet-Probe Robots

Discovery of whether life exists in space is the aim of unusual machines to explore without astronauts, with the surface of Mars as first goal—By Barbara Tufty

See Front Cover

➤ U.S. SCIENTISTS today are constructing devices deep in their laboratories which they hope will detect life on planets deep in space.

In eight realistic projects, scientists are building special microscopes, traps, capsules, and other instruments which will be landed on distant planets. There the inventions will, among other chores, suck up or reel in planet material, grow microorganisms, analyze wavelengths of light, and relay the information back to earth.

These and other projects in man's great search for space life are underway with the backing of the National Aeronautics and Space Administration.

Assuming that life everywhere in the universe must have a similar chemistry to life as we know it on earth, NASA scientists are now working on the following projects:

The multivator life detection system will use a tiny biological laboratory in a capsule to analyze dust from a planet and signal results back to earth. The housing, a metal tube only two and one-half inches in diameter and ten inches long, is being designed at Stanford Medical Center under the supervision of Dr. Joshua Lederberg, a Nobel Prize winner.

The Vidicon microscope will be used for direct vision of a microbe on Mars, with a camera amplifying the transmitting signals of light and shade.

This instrument, designed by Dr. Lederberg and associates to weigh less than three pounds, will collect dust particles during the ten-minute descent from the satellite to Mars' surface, as well as after it has landed. The lens will search for geometric shapes of microbes such as we have on earth.

The J-band life detector is an apparatus to detect proteins, the building blocks of life on earth. By analyzing intense absorption bands called J-bands, two NASA biochemists, Drs. L. P. Smith and R. E. Kay, hope to find evidence that the atmospheric or surface dust of Mars contains proteins—and hence, perhaps life.

Gulliver, or the radioisotope biochemical probe will include a capsule containing a "universal culture medium" or broth in which captured microorganisms can grow. As the capsule lands on Mars, three bullets will shoot out, carrying 50-foot strings coated with a sticky substance such as glycerol, as shown in an artist's conception on this week's front cover.

A reeling mechanism inside the capsule will draw back the strings, on which cling particles of planet material. The particles will then soak in the universal broth, and, if alive, they should begin to grow within four hours, according to NASA scientists, Drs. Gilbert V. Levin and Norman Horwitz.

Radioactive gas produced by the growing organisms starts a miniature Geiger counter clicking, and the signals will be relayed to earth ears.

The wolf trap consists of a cylinder containing a growing broth, and a vacuum tube which will suck up the possible microorganisms on the planet's surface. Designed by Prof. Wolf Vishniac, it was originally called the "bug detector," but for obvious reasons, the name was changed.

Optical rotary dispersion profiles is a method based on the fact that light is absorbed in various ways by the complex molecules of life. By using new techniques of science, Dr. Ira Blei will be able to tell the presence of life's basic substance, DNA, which is science shorthand for deoxyribonucleic acid. This giant molecule, looking like a string of twisted beads, is composed of life's basic ingredients: nitrogenous bases, sugar and phosphoric acid.

By a special property of a DNA sugar combined with a nitrogenous base, a plane of polarized light can be intricately rotated in a unique way. If instruments on planets record such a rotation, it would indicate the existence of life as we know it.

The mass spectrometer project, under the supervision of Dr. Klaus Beimann, will be able to detect molecules on another planet that are biologically similar to those on earth as well as life-related substances not necessarily like our familiar life compounds.

The ultraviolet spectrophotometer project will identify protein substances on another planet by means of their response to certain frequencies of light.

In a comprehensive pamphlet, The Search for Extraterrestrial Life, released by NASA, scientists explain that these instruments may land on Mars or another planet in a scientific package ejected from a passing satellite. There they will collect data and relay their findings on possible life back to the satellite, or "bus" as it is called, which will send the data on to earth.

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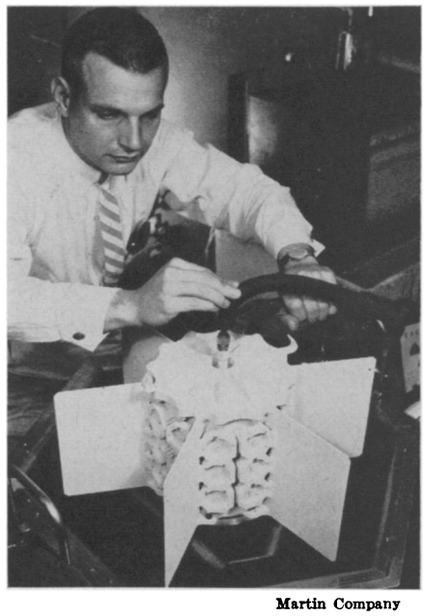

Martin Company

ATOMIC BATTERY — Charles R. Fink, SNAP-9A program manager, Martin Company, Baltimore, prepares SNAP-9A nuclear generator, the latest of long-lived electrical supplies for satellites, for its space flight.

SPACE

Snappier Atomic Battery Generates Orbit Energy

➤ SNAP, a compact and economical "atomic battery," is supplying full power for the instruments of a Department of Defense satellite.

The small SNAP (Systems for Nuclear Auxiliary Power) generator, 9A-model, placed in orbit on Sept. 30, is 10 inches tall and 20 inches around the middle and weighs only 27 pounds. It is designed to generate 25 watts of direct electrical power using plutonium-238 for fuel.

Two smaller SNAP-3's are also already in orbit. These grapefruit-size generators produce only part of the instrument power for the satellites. The rest is generated by conventional batteries and solar cells.

Aside from operational limitations of solar cell power, it costs about $1,000 a watt while SNAP power costs about $300 a watt.

The Defense Department is not talking about the type of instruments to be powered by the SNAP-9A.

About a dozen SNAP units have been under development for the Atomic Energy Commission for use on land and sea as well as in space.

The SNAP-7C has been supplying power for a weather station in the Antarctic since 1962. A SNAP-7A will power a buoy in the Chesapeake Bay, and a SNAP-11 is being developed for Project Surveyor, the unmanned moon exploration program.

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SPACE TECHNOLOGY

Antennas for Moon Being Designed

➤ ANTENNAS for the moon are already being designed. But it will be a while before the moon antennas take over like TV aerials on a New York apartment house. Minute details and broad theories are still being mapped out.

Plans for setting up lunar antennas were detailed at the 1963 National Space Electronics Symposium in Miami Beach by Malcolm A. Stephens of Martin Company, Orlando. The antennas would keep moon stations in touch with the earth.

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