SPACE

Why Reach for the Moon?

Reaching for the moon symbolizes the unattainable, but now, through science, the unattainable is within man's reach, Lillian Levy reports.

➤ THROUGHOUT history man has dreamed of going to the moon. The phrase "reaching for the moon" has come to symbolize the unattainable, the unrealized dream.

Now, through science, the unattainable is within reach; dream promises to become reality and manned lunar exploration is a national objective.

Why? Why does man want to go to the moon? Why should he go? What can he expect to find when he gets there? What kind of man should be first to go to the moon?

Reasons for Going

Judging from letters to government officials from young and old would-be lunar pioneers, going to the moon for most is a chance to escape from the vexing restrictions and tyrannies, imagined and real, of life on earth.

A child from Arizona writes, "If I got to go, I could be free." A young girl from Asia, resentful of the subordinate status of women in her country, wants to go to the moon to prove that women can perform as well as men in space (and on earth) if given the chance. A prisoner wants to make up for a misspent life by risking death in the first flight to the moon.

An idealist wants to go to the moon with a hand-picked group of superior men and women to set up a perfect society. The astronaut seeks to blaze a trail in a new frontier, while the scientist looks to the moon for truth and knowledge about the world around him.

Those reaching for the moon to escape from earth or to find perfection lacking on earth, still strive for the unattainable.

The conquest of new frontiers and the search for knowledge about the universe are the goals that justify the $20 billion or more the United States will spend to land a man on the moon; and to achieve this successfully, man cannot leave earth behind. He must, in fact, take an earthly environment with him. Thus protected, astronauts riding to the moon in Apollo, the three-man spacecraft being developed by the National Aeronautics and Space Administration, will seek the answers to many secrets of the solar system and even the universe.

The silvery moon is an earth satellite without an atmosphere. Because it has no atmosphere, the moon has been bombarded by many objects from space which have remained on its surface, undisturbed for billions of years. By studying the moon's surface and identifying the imbedded objects scientists may get clues about the formation of earth and life as we know it.

The absence of atmosphere also makes the moon an ideal astronomical observatory. The entire solar system can be observed with a clarity not possible on earth because of its atmospheric curtain.

The moon is an ideal launch site for interplanetary travel. Its gravity is only one-sixth that of earth and therefore less rocket power is needed to launch vehicles from its surface.

Lunar exploration will make it possible to discover whether life may exist on other planets. It is even possible that some sort of life may exist on the moon in spite of its extreme environment.

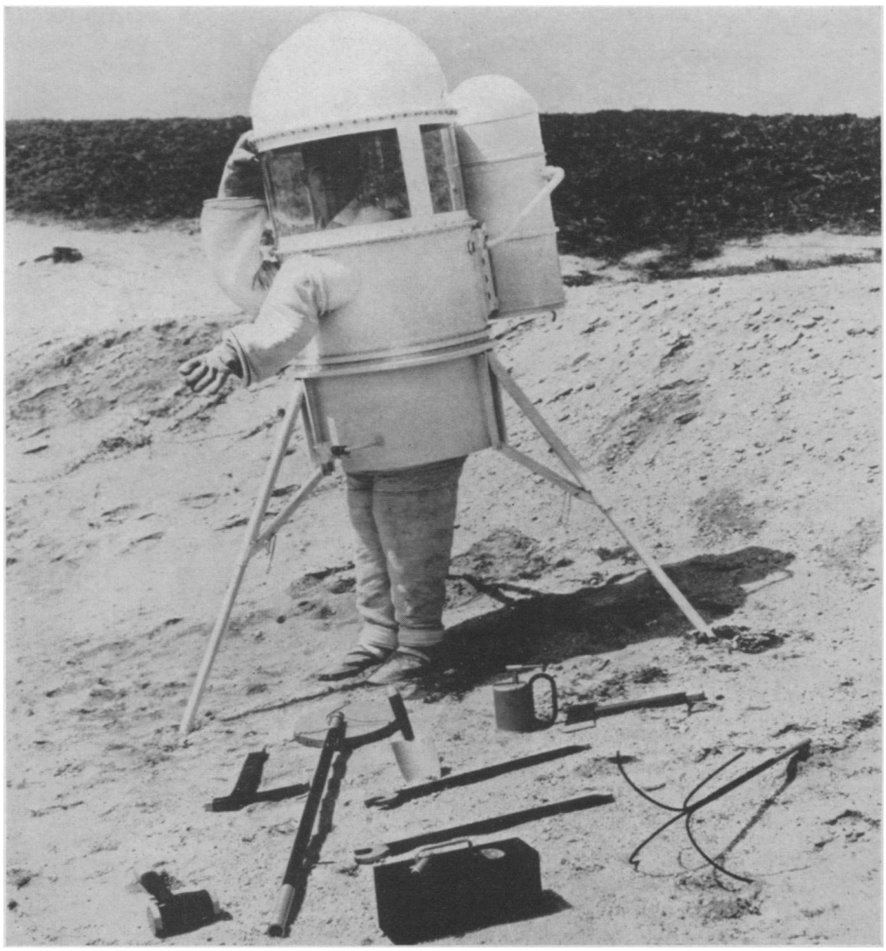
These are only some of the reasons why man should go to the moon and give a hint as to what he may find.

Because of the staggering expense of a manned lunar voyage, it is important that a scientist be a member of the astronaut crew that will pioneer to the moon. The scientist-astronaut can concentrate on basic experimental research and observations while the pilot-astronaut is busy with the buttons and gadgets needed for the flight and landing.

The choice of a scientist-astronaut must assure that much more than superficial science advances are made. The scientist must be trained in a field that will yield the most information when applied to lunar research. Which should be given priority: biology, geophysics, astrophysics, astronomy, geology, biochemistry?

In an informal poll taken by SCIENCE SERVICE among scientist working in the National Aeronautics and Space Administration as well as in academic and industrial centers, the majority vote went to geology.

Dr. Robert Jastrow, geophysicist and direstor of NASA's Institute for Space Studies at Columbia University, said a geologist should be first because, "better than any other science specialist, he see the working of the forces of nature and can best inter-



MOON WORK SUIT—This tripod tepee coverall is an experimental suit to protect an astronaut while exploring the moon's surface.

pret the effect of these forces in forming the moon."

He is also, by practice and training, more likely to find and tap the resources that may be on the moon, such as water and fuel, necessary for establishing a lunar colony. His observations cannot be done by instruments alone whereas much of the data sought by scientists in the other disciplines could be gained from unmanned lunar exploration or from orbiting satellites.

Instruments landed on the moon can gather dust samples, take radiation measurements to date and identify lunar particles. A seismometer on the moon could transmit information about what's inside the moon. A gravimeter could measure the response of the moon to the pull of earth and sun. An orbiting astronomical observatory can transmit pictures of the planets and stars.

But instruments even at their best cannot contribute the judgment and discrimination in observation that only man can provide.

"Thus," as the Space Science Board of the National Academy of Sciences reported on Feb. 10, 1961, "the carefully planned and executed manned scientific expeditions will inevitably be the more fruitful."

Meanwhile instrumented satellites will help pave the way for a manned landing on the moon. Instruments landed on the moon will gather and relay data back to the earth on what kind of landing surfaces man can expect. They will search out the best landing sites and measure the depth of the surface dust.

When man does finally get to the moon, the advances in technology that will have resulted from this achievement may make life so pleasant on earth that he will want to leave it only to advance his knowledge.

• Science News Letter, 82:90 August 11, 1962

SPACE

One-Way Space Mission To the Moon Possible

See Front Cover

➤ THE FEASIBILITY, from a technical standpoint, of sending a man on a one-way mission to the moon without the propulsion to bring him back to earth was explored by two Bell Aerosystems Company scientists.

John M. Cord, project engineer in Aerospace Preliminary Design, and Leonard M. Seale, chief of the Human Factors Section, at Textron's Bell Aerosystems Company, Buffalo, N. Y., emphasized that they do not advocate such a mission although they believe it will be possible to provide a means of returning the lunar explorer or explorers to earth at some later date.

Even though the utmost care would be taken to assure the lunar explorers' safety, they warned such a mission is an extremely hazardous one.

"Therefore, the moral, ethical and religious aspects of the one-way manned mission are left for others to discuss."

The scientists concluded after their detailed scientific and technical analysis that one-way manned lunar missions are feasible. In fact, they asserted, the man can be kept alive indefinitely to do valuable scientific work.

Seen on this week's front cover is an artist's conception of a possible lunar base for the proposed one-way space mission. The lunar explorer's shelter, upper center, is covered with lunar rubble to provide radiation protection and control temperature. The one-way lunar spacecraft is shown in the lower left corner mounted atop its retro-propulsion stage. Cargo vehicles and required support facilities are also shown. The earth appears at the upper right.

"The system elements are within the current state-of-the-art and the booster requirements are significantly below that for missions with return capabilities," they declared.

During his stay on the moon, the lunar explorer would be supplied with food, water, oxygen, medical supplies, scientific and recreational equipment through a logistics system consisting of unmanned cargo vehicles boosted from earth and retro-landed near the manned lunar base.

"The primary reason for considering the one-way manned space mission is the enhancement value of scientific and possibly military achievement which can be accomplished by putting a trained scientist or military observer on the moon at an early date," according to Mr. Cord and Mr. Seale.

They noted that such a mission would increase the probability of success of the Apollo three-man lunar program projected for the 1970 time period by making scientific evaluations which only man can perform and preparing the Apollo landing site.

The one-way manned mission can begin with a series of cargo launchings to provide shelter, food, water, oxygen, electrical and communications equipment. After it has been determined that each of these vehicles has landed safely, the manned spacecraft would be launched to land the one-way space man at the lunar base site.

The one-way mission could be launched from earth by much smaller boosters than would be required for a vehicle with a return propulsion system. These boosters will become available years before the larger boosters which would be required to launch a mission with earth-return capability.

• Science News Letter, 82:91 August 11, 1962

Questions

BIOCHEMISTRY—In what tissue is cytochrome f found? p. 82.

BIOPHYSICS—How did scientists show that bacteria actually use electrons? p. 83.

ICHTHYOLOGY—What system in the salmon allows them to adapt quickly to salt water from fresh water? p. 88.

MEDICINE—What is more important than treatment in controlling cancer? p. 85.

NUTRITION—What country was the first to embark on a program to manufacture concentrated fish protein? p. 87.

SPACE—Why may a geologist be the preferred scientist for the first trip to the moon? p. 90.

Photographs: Cover, Bell Aerosystems Company; p. 82, Science Service; p. 83, U. S. Bureau of Mines; p. 85, American Cyanamid Company; p. 87, Science Service p. 90, National Aeronautics and Space Administration; p. 96 (top), Bush Brothers Products; p. 96 (bottom), Allen M. Pearson.