

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.

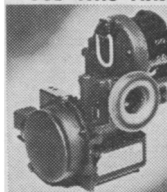
SPACE—Why may a geologist be the preferred scientist for the first trip to the moon? p. 90.

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.

SCIENCE BARGAINS

Order by Stock No.—send check or M.O. Shipment same day received—satisfaction or money back.

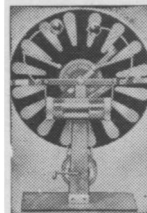
USE THIS AIR FORCE BUBBLE SEXTANT



ANYWHERE—Land or Sea
ANYTIME—Night or Day

Lighted bubble makes "anytime, anywhere use" possible. Employ as straight sextant to measure elevations referenced to bubble or horizon; or measure elevations with self-contained clock-driven mechanism that shows degrees and minutes of elevation averaged through a two minute sighting on a dial counter. Besides bubble, and swinging prism (for use with natural horizon), sextant contains astigmatizing lens, 4 sun shades, adjustable focus, rubber-padded eye-piece. Extras: suspension hook, spare bulbs, rheostat-controlled battery case. Measures 120 degree angle from -10 degrees to +110 degrees. Vernier drum reads to 2 minutes, may be interpolated to 1 minute. In late use by U.S.A.A.F.

Stock No. 70,574-Q
Used-good condition \$32.50 Postpaid



NEW! STATIC ELECTRICITY GENERATOR

Sturdy, Improved Model

See a thrilling spark display as you set off a miniature bolt of lightning. Absolutely safe and harmless. Sturdily made—stands 14" high. Turn the handle and two 9" plastic discs rotate in opposite directions. Metal collector brushes pick up the static electricity, store it in the Leyden jar type condenser until discharged by the jumping spark. Countless tricks and experiments. 24 page instruction booklet included.

Order Stock No. 70,070-Q \$12.95 Postpaid



CRYSTAL-GROWING KIT

Do a crystalography project illustrated with large beautiful crystals you grow yourself. Kit includes the book "Crystals and Crystal Growing" and a generous supply of the chemicals you need to grow large display crystals of potassium aluminum sulfate (clear), potassium sulfate (purple), potassium sodium tartrate (clear), nickel sulfate hexahydrate (blue green) or dehydrate (green), potassium ferricyanide (red), and copper acetate (blue green).

Stock No. 70,336-Q \$9.50 Postpaid



BUILD A SOLAR ENERGY FURNACE

A fascinating new field. Build your own Solar Furnace for experimentation—many practical uses. Easy! Inexpensive! Use scrap-wood! We furnish instructions. This sun powered furnace will generate terrific heat—2000° to 3000°. Fuses enamel to metal. Sets paper aflame in seconds. Use our Fresnel Lens—14" diameter . . . 14".

Stock No. 70,130-Q \$6.00 Postpaid

11" SQ. FRESNEL LENS P.L. 19"

Stock No. 70,533-Q \$4.75 Postpaid

SPELLBINDING EXPERIMENTS WITH SILICON SOLAR CELL AND SUN BATTERY!



Experience endless fascination in converting sunlight into electricity to power small motors, amplifiers, etc. Ideal for scientific student projects. Plastic case 1 1/4" x 1 1/4" x 3/16". Produces 3 to 45 volts—10-16 milliamps. 24-page Handbook gives full data on 12 pat experiments.

Stock No. 60,216-Q \$2.25 Postpaid

Selenium Photozell. Lower power, lower price than Silicon Cell.

Stock No. 30,411-Q \$1.50 Postpaid

Solar Cell and Photozell Handbook. Fascinating 112-page Handbook on Silicon-Cell and Selenium projects, demonstrations, etc. Explains photovoltaic theory, performance. Gives infrared and ultra-violet applications. Paperbound, 6" x 9".

Stock No. 9230-Q \$2.00 Postpaid

WOODEN SOLID PUZZLES



12 different puzzles that will stimulate your ability to think and reason. Here is a fascinating assortment of wood puzzles that will provide hours of pleasure. Twelve different puzzles, animals and geometric forms to take apart and re-assemble, give a chance for all the family, young or old, to test skill, patience, and, best of all, to stimulate ability to think and reason while having lots of fun. Order yours now.

Stock No. 70,205-Q \$3.00 Postpaid

TEACHERS! Write for Educational Catalog Q-2

Edmund Scientific Co., Barrington, N. J.

MAIL COUPON FOR FREE CATALOG "Q"

160 Pages! Over 1000 Bargains!

EDMUND SCIENTIFIC CO.

Barrington, New Jersey

Name

Address

City Zone State

