aerospace

PRE-LAUNCH ISOLATION

Research in disease

A panel of scientists of the National Academy of Science's Space Science Board has recommended to the National Aeronautics and Space Administration that astronauts be isolated for one month before launch.

The proposed isolation would be part of an effort to gain greater understanding of disease-causing microorganisms and the human body's response to them under varied conditions. According to the report, the closed environment of the space capsule would duplicate in some respects the crowded living conditions of cities, schools and homes.

The basic objective of the isolation would be to achieve a state of microbiological equilibrium among the astronauts before the flight. Infectious agents brought in by one astronaut would have time to appear and spread to the other crewmen. The crew in isolation before and during the mission would be protected from contacting new infectious agents, providing a controlled situation for study.

Still to be worked out is a response to the danger of microbial shock on the astronauts' return to earth. One consequence of long-duration flight in a spacecraft clear of microorganisms might be a dangerous susceptibility to infection for the crew after return to earth. The scientists noted that long exposure to reduced numbers and types of microorganisms might eliminate those organisms that build up defenses against infection.

LUNAR PHOTOS

Quiet in Ocean of Storms

Comparison of 60 Surveyor 3 pictures, taken in April 1967, with 20 Apollo 12 photographs taken by the astronauts in November 1969, shows little or no surface activity in that area of the Ocean of Storms on the moon.

Dr. Leonard D. Jaffe, Jet Propulsion Laboratory scientist, reported his findings at a COSPAR symposium last month in Leningrad (SN: 5/30, p. 520).

Only one particle, one-tenth of an inch in diameter, that was not in the Surveyor pictures appeared in the Apollo 12 pictures. And that little particle, Dr. Jaffe suggests, was probably kicked by an astronaut.

From the pictures, Dr. Jaffe also found that the sides of walls made in the lunar soil by Surveyor footpads and a surface sampler digging instrument were still in place.

MINI-SHUTTLE

Nose-up, nose-down tests

The proposed space shuttle of the late 1970's (SN: 5/23, p. 508), will enter the earth's atmosphere and land horizontally. In order to make this entry safely, the vehicle must enter at a high, nose-up angle to create as much drag as possible, then swing to a level cruise attitude to land. To study the aerodynamics of this transition, engineers at the Manned Spacecraft Center, Houston, Tex., have built a miniature shuttle, one-tenth the size of the proposed craft. The model, after initial systems verification tests in May, is now going through drop tests at White Sands Missile Range in New Mexico.

Dropped from a CH-54 helicopter at 12,000 feet mean sea level, the small craft pitches from a 60-degree, nose-up reentry angle, to a level cruise attitude and then to a nose-down crash landing. The on-board systems provide data on vehicle stability during the transitions, and during stalled conditions, as well as free-flight information for aerodynamic techniques.

During the first drop test May 28, the vehicle failed to level out after the initial pitch-over. The second test was scheduled for this week.

SPACE TUG

Workhorse design

An integral part of the space station/shuttle system expected to be in operation before 1980 is the space tug: a multipurpose, multimodule spacecraft that would service and link all present or future space vehicles and systems.

The tug, to be developed simultaneously with the space shuttle, would be carried into earth orbit in the shuttle's cargo bay. It would be used initially to transport up to 12 men and supplies from the shuttle to the station. Its multimodular design, however, would permit its use for jobs from lunar landings to space rescue.

The spacecraft would have three units, one each for crew, cargo and propulsion. The propulsion module, the core of the concept, would be a reusable system with two elements. One, weighing about 50,000 pounds, would be used for large velocity changes, such as planetary injection, braking, earth-orbital plane changes, synchronous orbits or lunar landings; a secondary element, weighing about 10,000 pounds, could be detached and used for smaller velocity changes.

Feasibility and preliminary studies for design and systems at the National Aeronautics and Space Administration and by the contractor, North American Rockwell Corp. in California, are now under way.

SPACE BIOLOGY

Three years on the moon

Biologists have believed for some time that life could be preserved in a lyophilized, or freeze-dried, state and would not be reactivated from this quiescence until again exposed to the proper nutrients and environment.

Microbiologists at the Manned Spacecraft Center in Houston believe this was dramatically illustrated with the discovery of a microorganism, *Streptococcus mitis*, returned to earth inside of the Surveyor 3 camera by the Apollo 12 astronauts.

The microorganism apparently survived the thermal vacuum tests to which the camera was submitted before the launch of Surveyor 3 in 1967. It survived the three-day journey in space vacuum and 950 days in the hostile lunar environment, where temperatures range from 270 degrees below to 210 degrees above zero F.

The *Streptococcus mitis* was discovered inside a one-cubic-millimeter bit of polyurethane foam used for insulation in the camera, retrieved in November.

The foam was placed in a thioglycolate broth, a bacterial media solution that is a type of nutrient. On the fifth day of incubation, says Capt. Frederick J. Mitchell, the scientist in charge of the experiment, the incubation tube was turbid with bacterial growth.