Space shuttle: Three long trials

Three recently completed long-duration tests involving human subjects are now helping researchers prepare for life and work aboard the space shuttle and its "Spacelab" crew-carrying research module. The tests are:

- The Life Sciences Spacelab Mission Development Test. Three people, along with white mice, white rats, fruit flies, a rhesus monkey and three pigtail macaque monkeys, emerged May 23 from a week inside a "high-fidelity" mock-up of Spacelab and the shuttle's flight-crew compartment. They conducted more than two dozen biomedical experiments in preparation for the real thing in the early 1980s. The test, held at the National Aeronautics and Space Administration's Johnson Space Center in Houston, was preceded by similar ones in October 1974 and January 1976.
- ASSESS II, the second Airborne Science/Spacelab Equipment System Simulation. On May 16, five people entered a sealed trailer at the NASA Ames Research Center in California, leaving it only through a closed tunnel to board a jet aircraft for up to nine six-hour research flights in 10 days. Four of the five—two each from NASA and the European Space Agency, which is building Spacelab—were "payload specialists," gathering data during the flights on earth resources, medicine, atmospheric pollution and infrared astronomy. The fifth person was the "mission specialist," acting as liason between the onboard researchers, a Mission Control Center and a large Payload Operations Control Center staffed by 20 people including the 10 scientists in charge of the research. The primary goal of the test, like that of the five-day ASSESS I in 1975, was to involve the NASA and ESA management teams in the same roles they will have during an actual Spacelab flight.
- Human tolerances to reentry acceleration after prolonged weightlessness. A group of 10 female volunteers spent 27 days of physiological testing in the Human Research Facility at Ames, including a nine-day stint of horizontal bedrest when they were not even allowed to raise their knees. The test, which began on April 27, was part of a series that began in 1973. The series will ultimately have provided data on 48 male and female subjects ranging in age from 35 to 65. Such tests are necessary, NASA feels, because many—perhaps most—of the space shuttle's passengers will be scientists and engineers rather than professional astronauts.

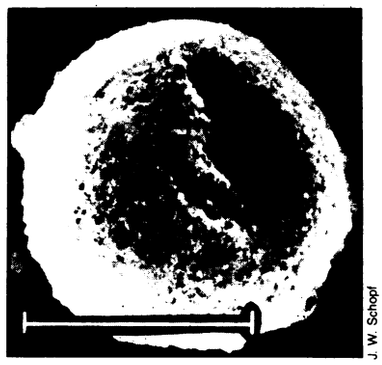
Long-term tests are nothing new to the space age. Studies of psychological responses to extended isolation, for example, were being conducted as long ago as the 1950s with an eye toward future space stations and interplanetary spaceflights. The space program, however, is finally getting within sight of the time when such protracted missions may be a reality. Skylab crews spent up to 84 days in their orbiting workshop, but their training for such activity will almost surely prove to have been far more exhaustive than that of either Spacelab researchers or future space-colony residents. In a Soviet test reported last year (SN: 11/13/76, p. 314), three subjects spent six months cooped up in a sealed environment, living as part of an experimental "closed ecology" that provided their food, water and air. Psychological responses were not discussed in the report, but Soyuz 21 cosmonauts Boris Volynov and Vitaliy Zholobov reportedly complained of "a state of sensory deprivation" after 49 days aboard the Salyut 5 space station last summer.

Some of the lengthy studies also provide valuable information outside their own direct concerns. The ASSESS II scientists, for example, were collecting real data in their respective fields from the biomedical, astronomical and other experiments conducted during the trailer-to-plane test at Ames. The jet—a NASA Convair 990 named Galileo II—was scheduled for up to four "unconstrained" flights after the completion of the test so that the scientists could wrap up their data. □

Out of earth's past: Biological 'roots'

Out of the silent mists of the earliest seven-eighths of the earth's geological past, a quiet revolution has been occurring in scientific understanding of life's biological roots. In the past decade, knowledge of the history, distribution and diversity of early life has grown rapidly. Paleontology has been in a renaissance. Among the foremost important advances has been the discovery that the fossil record of the earliest, most primitive organisms to have lived on earth—those from the Precambrian era, prior to 600-million years ago, is far longer and more detailed than was previously believed.

One of the most prominent participants in this active field of research has been a young paleontologist from the University of California at Los Angeles. His name is J. William Schopf. While still a graduate student at Harvard in the 1960s, he wrote 10 papers based on his studies that established beyond doubt the existence of Precambrian microorganisms and that showed that biologic systems were already in evidence more than 3 billion years ago. Since then he has continued his fruitful work, pioneering research methods for studying ancient microfossils, compiling an impressive list of "firsts."



Schopf and late Precambrian microfossil from Bitter Springs formation, Australia.

For instance during a visit to the Soviet Union in 1975, he discovered eight new deposits of ancient microscopic fossils ranging from 570 million to 1.2 billion years of age. Of the some three dozen such deposits known in the world, Schopf has now discovered more than half. He is now recognized as one of the leading experts in the study of early life on earth.

Last week Schopf, professor of geology and geophysics at UCLA, and still only 35, was named recipient of the second Alan T. Waterman Award given by the National Science Foundation to an outstanding young scientist. The award, authorized by Congress in 1975, carries with it a grant of up to $50,000 a year for each of three years for research or advanced study. The award's chief criterion is that recipients show "outstanding capability and exceptional promise for significant future achievement." At 31, Schopf became the youngest full professor in the history of UCLA's Department of Geology and one of the youngest in the university's history.

After receiving the award at the ceremonies in Washington, Schopf said he plans to use the grant money to assemble, for about one and a half years, a sort of superstar interdisciplinary team at UCLA. It will include two geochemists, two evolutionary biologists skilled in computer simulations, one expert in atmospheric evolution and two specialists in the life-form remnants called stromatolites.

The group will work on direct evidence in the geological record relating to the origin of life ("there are a great number of unsolved problems," he notes) and in developing more accurate ways to date sedimentary rocks.

Asked about precedents for assembling such a team, Schopf said: "I've never heard of anyone doing it before." □