

Simulating a full Skylab mission

Most of the space biology and medicine done by NASA with astronauts in space has been superficial. Generally it has been limited to prevention and relief rather than to a thorough examination of what happens to the body in space.

Now, with recent experimentation changes on Skylab and an upcoming Skylab simulation, the situation may change. Around July 19, three astronauts—Robert L. Crippen, William E. Thornton and Karol J. Bobko—will enter a six-meter-diameter altitude chamber at NASA's Manned Spacecraft Center in Houston. The chamber will have the same atmosphere as space cabins—70 percent oxygen and 30 percent nitrogen with 5 pounds per square inch of pressure. They will stay there, they hope, for 56 days, the expected duration of a full Skylab mission.

The experiment is called SMEAT (Skylab Medical Experiments Altitude Test). Its purpose is to establish a baseline for Skylab. It will help anticipate expected changes in the body due to temperature variations, cramped spaces, atmospheric pressures and constituents, effects of noise at that pressure, Skylab food and so forth. Weightlessness will be the only aspect not simulated. Most of the medical experiments will be done including analyses of blood, urine, feces, respiratory products, bone mineralogy, body fluids, metabolic rates and cardiovascular deconditioning.

NASA looks into hybrid rockets

Rockets fueled with liquid oxidizers are expensive. Solid rockets, such as those that will augment the space shuttle engine (SN: 4/1/72, p. 220) are cheaper, but their performance, or specific impulse is lower. (Specific impulse is the number of pounds of thrust produced by one pound of propellant per second.) A combination of liquid and solid rocket technology—called hybrid rockets—has never been used by NASA for space vehicles. Now, the agency has given the United Technology Center, Division of United Aircraft Corp., a contract to look into the performance of such rockets. Hybrid technology has some advantages, such as a restart capability (a solid cannot be restarted), higher specific impulse (about 370 compared to the 280 of solids), and a controlled-thrust capability.

Another approach to a quiet aircraft engine

NASA is trying to produce a quiet engine for its STOL (short take off and landing) aircraft (SN: 4/14/71, p. 269). Recently it awarded the General Electric Co.'s Aircraft Engine Group in Cincinnati a \$1,236,500 contract for testing a promising method called "inlet choking" to be used with augmentor wing craft. The term is misleading, says Robert S. Ruggeri, manager of the project at NASA's Lewis Research Center. The main idea is to choke or control the flow of air coming into the engine until the air reaches the speed of about Mach 1, the speed of sound. When air speed is controlled at the speed of sound, the noise generated by the engine fan and compressor cannot propagate out through the choked area. Noise still comes out the back of the plane, but by choking off forward-propagating noise, the engineers hope to reduce the total noise to 88 or 90 decibels. This compares with 95 to 120 decibels for today's aircraft.

Pesticides and impotence

The effects of chlorinated hydrocarbon pesticides, such as DDT, in the environment are subtle; obvious acute poisoning occurs only with larger amounts. One known sub-acute effect of environmental quantities of DDT is egg-thinning in large carnivorous birds. Impotence among farm workers in England exposed to pesticides has at least been associated with the exposure.

Warning that his results are not yet conclusive, a West Virginia University pharmacologist, John A. Thomas, says his work with guinea pigs, rats and mice shows that DDT and similar pesticides may alter sex hormone balances in mammalian males and cause impotence.

Using radioactively labeled pesticides, Thomas discovered they stimulate production of certain liver enzymes that have a role in controlling the balance of sex hormones. DDT also suppressed certain functions of the prostate gland, for which the pesticide has great affinity.

Thomas says caution must be used in interpreting his results. The hormonal changes have not yet been associated definitely with impotence, and amounts of pesticides given were larger than environmental amounts.

Vitamin E and smog

Residents of Los Angeles and other smoggy cities might be well advised to take vitamin E supplements, report three researchers.

Daniel B. Menzel of Duke University, Jeffrey W. Roehm of Battelle-Northwest and Si Duc Lee of the Environmental Protection Agency report that the survival time of rats exposed to two smog-associated air pollutants is approximately doubled when the rats are given vitamin E supplements.

The two pollutants are nitrogen dioxide and ozone, both oxidizing agents. The researchers say vitamin E's protective action comes from its antioxidant effects (SN: 1/15/72, p. 44). Unsaturated fats in the bodies of organisms are particularly susceptible to oxidation to toxic peroxides. Vitamin E blocks the oxidation, which would otherwise be enhanced by either of the two pollutants.

Vitamin E's effects were most dramatic with ozone. Half of a group of rats deprived of vitamin E died in 8.2 days when exposed to 1.5 parts per million of ozone. Rats similarly exposed to ozone but given vitamin E stretched the period out to 18.5 days.

Roadside noise 'thermometer'

Antinoise ordinances are notoriously difficult to enforce, especially for vehicles. The best that police can do—if they are inclined to do anything—is give an occasional ticket to drivers of autos or motorcycles with unmuffled or poorly muffled exhausts. Experts say that public education about the hazards of noise may be a more effective approach.

The National Research Council of Canada has set up a "noise thermometer" on streets in Edmonton, Alta., which graphically shows motorists the A-weighted decibels given out by their vehicles and compares them with legal levels. A microphone alongside the road picks up the vehicle sound. Then a little farther ahead, a lighted and easily read 8-foot-high device resembling a thermometer displays to motorists (and motorcyclists) the decibel ratings of their vehicles and the legal limit for the type of vehicle.