

ASTRONAUTICS

Men Survive High Oxygen

► **SIX MEN** have spent seven days in a compartment containing more than two and a half times normal oxygen concentration with little ill effect.

This was disclosed by Capt. Charles F. Gell of the Office of Naval Research at the American Rocket Society meeting in New York. Dr. Gell's experiment was prompted by the lack of unanimity of opinion regarding the maximum oxygen percentage to which humans could safely be subjected.

All the men experienced a reduction in vital lung capacity (maximum amount of air that can be exhaled after a maximum inhalation), and two showed signs of a slight oxygen toxicity.

The compartment involved was a low-pressure chamber measuring 11 by six by seven feet, fitted with bunks, toilet, sink, and a water bath for heating K rations. Window ports were fitted with polarized glass so that the men could not look out but observers could look in.

The oxygen pressure within the chamber was kept at 418 millimeters of mercury and the nitrogen pressure at 103 millimeters. This compares with 152 millimeters and 608 millimeters, respectively, in normal atmosphere at sea level. In other words, oxygen comprised 55% of the test atmosphere, whereas it comprises 20% of normal atmosphere. Carbon dioxide was kept to a minimum by the use of absorbents.

Blood and X-ray studies were made immediately before and after the experiment, and daily urine samples, pulse readings, and chest expansion and vital capacity measurements were also taken.

Psychological performance tests were

pipied in on tape. Nine and a half hours each day were devoted to testing, eight hours to sleep and the remainder to leisure time. At any given time two men were always sleeping, three were working and one was idle.

From a psychological point of view, said Dr. Gell, the men were in satisfactory shape at the end of the run and there was no evidence of undue stress. The men performed well and remained companionable. However, toward the end of the experiment, they complained about the monotony of the food and the disturbing odors in the chamber as a result of confinement.

The reduction of vital capacity noted was due to folding up of the alveolar air sacs of the lungs. This might have been because at that high an oxygen level a large lung area is not required.

It might also indicate that some inert gas, such as nitrogen, is needed to keep the alveoli distended.

The main result of the experiment, said Dr. Gell, is that this concentration of oxygen is probably the very top limit, for this particular set of circumstances, to which man can be safely subjected over a prolonged period of time. With good training, discipline and high motivation, men can probably tolerate confinement similar to that expected in a space flight of at least seven days.

The experiment was carried out at the Navy's Air Crew Equipment Laboratory at the Naval Air Material Center in Philadelphia.

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heart rate at first-stage burnout, but a distinct increase was apparent at the beginning of weightlessness.

A detailed description of equipment and instrumentation development for the project was also contained in the report. Instruments designed to detect biological reactions were so delicate that electrodes measuring heart rate had to be attached to each mouse's thorax by intricate surgical means.

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CONSERVATION

Hexadecanol Useful In Controlling Water Loss

See Front Cover

► **REDUCING** evaporation from fresh water lakes, streams and reservoirs could save the United States millions of acre-feet of water.

Use of hexadecanol is a possible solution to the evaporation problem, Floyd E. Dominy, associate commissioner of reclamation, Department of the Interior, told the National Reclamation Association meeting in Houston, Texas.

The light covered area in the upper left of the photograph on the cover of this week's SCIENCE NEWS LETTER has been covered with a one-molecule thick layer of hexadecanol. The wake of the dispenser boat with a dark line separating the output of the two nozzles is visible on the right edge of the covered area.

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EDUCATION

National Academy Offers Science Study Aid

► **IN RESPONSE** to the demand for information related to the International Geophysical Year activities, "Planet Earth" has been designed and produced as a dramatic and colorful supplement to school textbooks. A well-illustrated booklet for students describes specialized scientific work in a dozen or so fields. Classroom experiments, teaching suggestions, background material and information on science scholarships are included in a teacher's kit. Six full-color posters, each three feet by four feet, represent six fields of study: the earth, the oceans, the poles, the sun and earth, weather and climate, and space.

"Planet Earth" was produced under the direction of Dr. Hugh Odishaw, executive director of the U. S. National Committee for IGY, with the assistance and advice of scientists, educators, designers and artists. The project was supported financially by the National Science Foundation and the Ford Foundation.

The materials are available at cost from the National Academy of Sciences Publications Office, Washington, D.C. A classroom package of six posters, 30 student brochures and a teacher's kit may be ordered for \$9.50. Poster sets, students' brochures and project leaders' kits also may be purchased individually at \$5.75, 50¢ and 75¢ respectively.

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ASTRONAUTICS

Mice Survive Re-Entry

► **THE TALE** of Laska and Benjy, the two mice sent aloft into space last summer in the nose cones of two-stage ballistic missiles, has its sequel in the first full scale report of Project MIA (Mouse In Able) presented at the American Rocket Society meeting in New York.

The two mice were rocketed to a higher altitude, about 1,400 miles, than that reached by any other living organism. The Russian Sputnik II, containing the dog Laika, reached an apogee of 1,050 miles.

Project MIA was planned in conjunction with the Project Able re-entry test program and in each of the three Able flights one mouse was carried in the nose cone. The first, however, carried an uninstrumented mouse and therefore no data were gathered. The second carried Laska and the third Benjy.

The experiences of Laska and Benjy were described in a report to the Society by Miss Franki L. van der Wal and W. D. Young of Space Technology Laboratories in Los Angeles.

Neither of the mice was recovered, but

there is every indication that they would have been found alive if the nose cones had been retrieved. Evidence shows that the last data points were received from Laska when the nose cone was suspended from the recovery parachute. If this is so, the mouse survived all the major stresses associated with the re-entry recovery operations, and returned to sea level alive after approximately 40 minutes of weightlessness.

Although no generalized conclusions regarding the behavior of mice in space may be drawn from Project MIA, some interesting observations were made. Take-off conditions were found to be not severe enough to produce any violent or continuing response from the mice. Furthermore, no evidence of distress due to weightlessness was noted in either flight.

Laska's heart rate increased fairly steadily with increasing acceleration load and began to drop slowly at first-stage burnout.

While the decrease in Laska's heart rate at burnout of the first rocket stage was gradual, at second-stage burnout it was sharp. No trend was detectable in Benjy's