

## PHYSIOLOGY

# Bathtubs in the Sky

**Pilots would be much less likely to blackout if they could sit in a tub full of water while doing fast turns and other evasive maneuvers.**

► IF THE PILOT of a fighter plane could sit in a bathtub full of water while he was doing fast turns, loops and other evasive maneuvers, he would be much less likely to blackout, Drs. C. F. Code, E. H. Wood and E. J. Baldes, of the Mayo Aero Medical Unit, told physiologists at the first session of the Federation of American Societies for Experimental Biology in Atlantic City.

Sitting in a specially constructed bathtub built into a cockpit, men were spun around on a human centrifuge to test the effects of immersion in water as protection against blackout. The men sat in exactly the same position that they would have to assume if they were in a plane dodging the enemy in fast maneuvers.

First tests were made sitting in the tub without water. Later, water was added to various body levels.

On the average, with water up to just below the breast bone, the men were protected against the effects of acceleration to an amount expressed as 0.9 g. When the water level was raised to the level of the third rib, the protection was 1.7 g, which is comparable with the protection given by the special anti-blackout suits.

Presumably, the water in this sky bath should not be hot or even pleasantly warm, because these same investigators, working with another colleague, Dr. E. H. Lambert, found that warm, humid surroundings lower tolerance for sudden changes of direction and speed.

Based on tests conducted on the human centrifuge, it was concluded that at a temperature of 89 degrees Fahrenheit and 77% relative humidity, tolerance was reduced as much as 0.7 g from what it is at 63 degrees F., 72% relative humidity.

Another way of protecting the pilot against blackout may be to give him a full meal or a couple of quarts of milk or water before he takes off. Drs. William G. Clark and Helen Jorgenson, of the Department of Aviation Medicine, University of Southern California, reported to the same session that a heavy meal increased tolerance to positive acceleration although only slightly. Drinking

about two quarts of liquid (1.5 to 2.0 liters) was more effective, giving a 0.2 g protection at an acceleration three to four times that due to gravity, but this is considerably less than that afforded by the pressurized abdominal belts in anti-blackout suits.

## Effects on Brain

► AIRPLANE pilots who fly at high altitudes all day, and day after day, may expect no ill effects on their brain cells unless they go frequently to altitudes of 30,000 feet or more, provided experiments conducted on guinea pigs may be considered as applying to man.

In the experiments reported by Drs. W. F. Windle and A. V. Jensen of the Institute of Neurology, Northwestern University Medical School, animals were placed under atmospheric pressure equivalent to that of 23,000 feet altitude for six hours daily and six days a week until the guinea pigs had run up as much as 500 "flight hours."

Sections of the brain were then examined under the microscope. No evidence was found of hemorrhages or blood vessel changes. No alterations in nerve cells were found, or reduction in their number.

Other guinea pigs were given 100 hours at 23,000 feet and then another 100 hours at 30,000 feet. Although these animals showed no outward sign of brain injury, some areas of softening due to brain anemia were found. No hemorrhages were found in the brains of these "stratosphere flyers" and no generalized condition of abnormality in the brain.

## Speed of Blood Flow

► WHEN YOU ARE RESTING, blood flows through your brain at the rate of about 10,000 drops per minute, the same session learned from a report by Drs. Frederic A. Gibbs, Harry P. Maxwell, Erna L. Gibbs, and Ruth E. Hurwitz, of the University of Illinois College of Medicine.

If you breathe deeply and rapidly, as the flyers do who are suffering from lack of oxygen, the blood flow will invariably be slowed down. If you breathe

a high concentration of carbon dioxide the flow will be speeded up.

The Illinois investigators clocked the flow of blood through the brain by an ingenious method. A two-tenths per cent solution of a dye called Evans Blue was injected at a regular rate into the right internal carotid artery in the neck. Blood samples were then taken from the right jugular vein with and without shutting off the right internal jugular vein and from the femoral artery in the thigh. The difference in concentration of the dye in the blood from the arteries and from the vein gave the information for estimating the blood flow through the brain.

With this information and the difference between the venous and arterial samples in oxygen it is also possible to estimate oxygen consumption.

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## VETERINARY MEDICINE

## Buffalo Disease Traced to Filterable Virus

► A DISEASE that kills large numbers of water buffalo, most important farm work animals of the warm lands of southeastern Asia, has been identified as an encephalitis with a filterable virus as its cause, by Dr. T. S. Sheng of the National Central University at Chengtu, China. (*Science*, Mar. 15)

Chinese farmers call the disease "sze-giao-han", which means "four-legs-cold". This comes from the two most noticeable symptoms: when an animal is stricken, its owner finds it in the morning with its four legs stretched out stiff, and cold to the touch. Shortly afterwards it dies; Dr. Sheng states that 95% of all cases end fatally. No treatment is known, and no method of prevention.

Although the malady is so highly fatal to the animals, it seems to have no terrors for human beings. Dr. Sheng and his assistants worked freely among sick animals in the field, and dissected their brains in the laboratory, without even wearing rubber gloves. He adds that in all the cases he has encountered, no human being associated with the dying animals has ever contracted the malady.

Dr. Sheng proved the encephalitis to be due to a filterable virus by grinding up diseased brain and nerve tissue taken from dead animals and passing the extract through a germ-stopping filter. The filtrate was able to produce the disease in buffalo, goats and guinea pigs. Attempts to propagate the virus on incubated eggs were not successful.

*Science News Letter, March 23, 1946*