

PHYSICS—PHYSIOLOGY

Living "Glass" Described At Temperature Symposium

Athletes During Severe Exercise Have Fever Body Temperatures; Dogs Are Trained to Withstand Cold

BY TURNING their cells into a kind of living "glass" some microorganisms are able to withstand immersion into liquid air at temperatures of 190 degrees below zero Centigrade, it was reported to the symposium on temperature sponsored by the American Institute of Physics in New York.

Prof. Basil J. Luyet, St. Louis University's professor of biochemistry, told the scientists that matter can exist in four physical states: as a gas, as a liquid, as a crystal and as a glass.

Death by freezing comes because the temperature is lowered slowly. If an organism can be dipped into liquid air and pass on to the so-called vitreous state, some living tissues can be returned to a degree of vitality by quick warming to make them pass again through the danger stage of crystallization.

Prof. Luyet reported that he, and his collaborators, had used this rapid cooling to chill tissues from the epidermal cells of plants, moss leaves, frog's spermatozoa, isolated muscle fibers and myxamoebae. All these regained vitality on rewarming.

"Other protozoa or tissues experimented upon did not survive," Prof. Luyet said. "One of the reasons for the lower resistance of the latter seems to be their too-high water content and the impossibility of sufficiently dehydrating them."

"These observations and those of other investigators . . . favor the theory that

the structure required for vital activities is such that it is not destroyed by a lowering of molecular motion while it is destroyed by the withdrawal of some water molecules as when crystallization takes place."

Science News Letter, November 11, 1939

Athletes at Fever Heat

ATHLETES in severe muscular exercise can show body temperatures that normally would mean high fevers, Dr. Eugene F. DuBois of the Russell Sage Institute of Pathology, Cornell University Medical School, told the symposium.

Dr. DuBois, reviewing studies of the body's temperature, showed that the familiar 98.6 degrees Fahrenheit the clinical thermometer registers normally, is only one single spot between internal temperature and skin temperatures of 93.2 and lower.

In severe exercise the temperature may run up to 104 degrees Fahrenheit.

Just as the earth has broad zones of temperature so, too, does the body have its temperature levels, or zones. The torrid zone in man might be classed as that with temperatures of more than 105.2 degrees F. which can only be obtained by artificial fevers or when the body's temperature-regulating mechanism fails.

Just below this, in what might be called the semi-tropics, is the familiar

"fever" zone that is higher in temperature than normal and which comes from illness. With fever the skin temperature is warm. Here, too, come the higher temperatures of severe exercise which are accompanied, however, by cool skin.

The body's normal temperature zone, corresponding to the temperate zone on the earth, is fairly wide.

Below it come those body temperatures which are restored to normal values by shivering.

And finally, analogous to the polar regions on earth, is the body's zone of semi-hibernation where temperature regulation fails.

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Trained Dogs Endure Cold

FROM Harvard's four-man research team of the Fatigue Laboratory—Drs. M. Nielsen, W. H. Forbes, J. W. Wilson and D. B. Dill—came reports of Harvard's four trained dogs which will lie quietly on a net in a cold room at temperatures of from 32 to 53 degrees Fahrenheit and wear oxygen masks.

Exact physiological studies were made of their body activity as scientists tested skin temperatures, respiratory rate, pulse rate and did blood tests on them.

Three of the four dogs withstood the chilling tests well. They lay quietly, though not narcotized, in a semi-conscious condition most of the time.

At these low temperatures the dogs shivered moderately while breathing room air and thus increased their heat

VIBRATING VOCAL CORDS

Super-fast photography made possible the series of pictures taken at 4,000 a second from which these six representative views were selected. In them, the cords were vibrating at about 120 cycles in a high frequency note.



production and maintained their body temperature.

When the dogs breathed gas mixtures with lowered oxygen content through their masks the shivering soon stopped and their metabolism returned to the basal level and the body temperature fell about two degrees Centigrade per hour. Greatest total drop in temperature was six degrees Centigrade.

The temperature fell gradually, reported the Harvard scientists, until the dogs were switched over to breathing the air in the cold room. Then the body's metabolism suddenly increased four times and within a half hour the body temperature was back to normal.

"The ability of the dog to withstand low oxygen depends more on the toughness of his central nervous system than on an unusual ability to take oxygen in the lungs," conclude the scientists.

Science News Letter, November 11, 1939

Novel Oil Prospecting

A METHOD of oil prospecting by measuring temperatures in the earth at depths of 100 to 200 feet was described by Melvin C. Terry.

It is not necessary to take the temperature measurements at extreme depths because the intrusion of high conductivity materials will disturb the pattern of normal temperature gradients.

Working over the ground of producing Texas oil fields at Hastings and Friendswood, it was found that the line of constant temperature at 23 degrees Centigrade ran about 100 feet higher over the oil salt domes than it did in the region between them.

Science News Letter, November 11, 1939

New Theory on "Hot Spots"

THE TRADITIONAL explanation of the skin's sensitivity to heat and cold was discounted by new findings reported by Lehigh University's Dr. William LeRoy Jenkins, instructor in psychology.

The thought that temperature sensitivity of the skin was concentrated in small warm and cold spot receptors arose from the discovery that the locations of these spots could be mapped with a small stimulator.

Dr. Jenkins has carried forward the mapping technique and by the process of seriatim, or repeated mapping, has found that the single warm and cold spots do not exist.

"Seriatim mapping," Dr. Jenkins declared, "reveals hills and valleys of sensitivity. Warm and cold spots are found

only in clusters and mapping with smaller and smaller sizes does not resolve these clusters into discrete units; they simply disintegrate without being resolved."

As a new and better way to explain the skin's temperature sensitivity, Dr. Jenkins proposes a "concentration hypothesis" which suggests that the sensitivity depends primarily upon the concentration of the receptors. Where the receptors are highly concentrated, the skin's sensitivity is high. Where they are sparse, the sensitivity is low. According to this view, the traditional warm and cold spots are merely peaks of sensitivity and do not mark the locus of individual receptors.

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PUBLIC HEALTH—ECONOMICS

Drought in Far East Creates Serious Food Problems

DROUGHT in Japan and Korea, severely curtailing production of vegetables and rice, has created serious food problems, reports Kurt Bloch, writing in the *Far Eastern Survey* (Oct. 25). The drought has also resulted in severe damage to the fresh-water fisheries, while the production of sea fisheries has been cut

down by restriction on gasoline sales to the fishermen, forcing them to give up use of motor power for slower means.

In the meantime, the occupied portions of China have begun to present serious competition for existing food supplies. North China has always been a heavy wheat-consuming country, but before the outbreak of hostilities had got on a self-sustaining basis so far as this grain was concerned. Now North China imports 800,000 tons of wheat in a year—which means a staggering load on "yen bloc" finances.

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GENERAL SCIENCE

Scientists Shop and Pack For Year in Antarctic

See Front Cover

HOUSEWIVES will appreciate the problem of the U. S. Antarctic Expedition setting sail for the other end of the earth: Shopping for supplies for more than a year for two little communities, two base camps, plus exploring parties on the trail—1200 tons of everything well-ordered pioneering households will need, including the houses.

All are boxed securely against Antarctic cold and packaged so strong men can unload under adverse conditions.



COAL, TANKS AND MEN FOR EXPLORATION

The two leaders of the base camps to be laid down in Antarctica by Uncle Sam, Richard B. Black, East Base commander (left) and Dr. Paul A. Siple, West Base commander, inspect the converted Army tanks that will be used as "iron dogs" for snow travel. In the background, the "North Star," being loaded at Boston Army Base. Piles of bagged coal at left.