

Information of this kind is of great importance in conservation work, and it is presumably quite feasible also to use the echo-sounding device for the location of schools of fish in proper condition for catching.

In locating the fish schools, the apparatus worked in exactly the same manner as it does for showing bottom depth. Sound waves sent out from the ship's bottom were reflected off the fishes' backs and returned to the listening device just as they do from the rocks or mud of the sea bed. The length of time between the start of the sound and its return as a submarine echo indicates depth.

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PHYSIOLOGY

Severe Vitamin Lack Causes Nerve Breakdown

VITAMIN lack in diet, if severe enough, causes an actual breakdown and "death" of nerve tissue, experiments on rats by Dr. Charles Davison, of Montefiore Hospital, New York City, have demonstrated.

Rats were fed diets adequate to sustain life, except that each diet wholly lacked one or another of the vitamins, from A to E. The animals became ill, finally losing the use of their hind limbs.

When they were chloroformed and dissected, it was found that the nerves leading to their muscles were abnormal in appearance and structure, with an actual breakdown of the nerve substance itself, and in some cases brain hemorrhage.

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SEISMOLOGY

South American Quake Almost on Equator

THE EARTHQUAKE that caused destruction and death in the Colombian city of Pasto and in neighboring towns, on the morning of Wednesday, Aug. 7, had its center almost on the equator, near the Colombia-Ecuador boundary, U. S. Coast and Geodetic Survey seismologists announced after examining data transmitted through Science Service.

The location of the epicenter was given provisionally as one degree north latitude, 78 degrees west longitude. Time of origin was 4:02.2 A. M., Eastern Standard Time.

Stations reporting were those of the Jesuit Seismological Association at St. Louis University, St. Louis, Mo., and Georgetown University, Washington, D. C., and of the U. S. Coast and Geodetic Survey at San Juan, Puerto Rico.

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PHYSIOLOGY

Suspended Animation Possible Even to Human Beings

"Freezing" and Revival of Animals Merely Special Cases Of Inanition, Phenomenon Long Known to Physiologists

WITH LATE summer hot weather comes another nine-days'-wonder to press, radio and newsreel. Animals are being "frozen to death" and subsequently resurrected by laboratory miracles. In Hollywood, 180 persons are said to have offered themselves as human subjects for one of these super-chilling experiments. Maybe there was a hot wave in the California foothills at the time.

Although the animals used are of a higher zoological order than have figured in previous experiments of somewhat similar nature, the wonders now being reported are not wholly without precedent. At the bottom of the animate scale, bacteria and protozoa are notorious for their resistance to extreme cold. They even stand prolonged immersion in liquid air without apparent prejudice to their subsequent reproductive powers.

Interstellar Immigrants?

It has been suggested, by speculative philosophers, that evolution started with one-celled immigrants of this kind, floating in somehow, from some unknown elsewhere, through the unimaginable cold of outer space.

Higher in the scale, similar freezings have been inflicted on fish and frogs, with at least short-time survival after thawing.

Of course, all such creatures are not really frozen to death. If they were dead, they would stay dead, no matter how carefully thawed out. They are really in a state of low metabolism or life-process, known as "inanition" to scientists. With life-fires thus banked, organisms can exist for surprisingly long periods without visible signs of life.

Hibernating animals, like bears, woodchucks, ground-squirrels and turtles, display the phenomena of inanition in quite typical form. Their muscles are limp, their breath has practically ceased, there is no readily detectible heartbeat, their other organs seem to be without function. Their temperatures, even in the case of warm-blooded animals, drop to very little above that of the surrounding air. You can shake them, poke them, stick pins in them, without getting any re-

sponse. Only a gradual warming-up brings them to life again.

Inanition is an organism's response to extreme conditions against which it has no other defense. It is a feigning of death to defeat real death.

We do not commonly think of man as a hibernating animal, and he is not, under normal conditions. Yet he also is capable of invoking voluntary inanition in times of stress. Prof. Sergius Morgulis, of the University of Nebraska College of Medicine, tells of a hibernation-sleep resorted to by Russian peasants in famine times. They huddle together on the tops of their great flat stoves, by families, even by whole villages. Covered with all the fur coats available, drawing warmth from the stove and from each other, they conserve their life energies to the utmost, and with only a few unavoidable interruptions, wait for spring in practically continuous sleep.

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PHYSIOLOGY

Radium Never Stimulates; Effects Always Lethal

RADIUM'S effects on living cells are always in the direction of breakdown and death; its powerful radiations, principally of alpha particles, never act to stimulate more rapid growth.

These are the conclusions reached by Prof. Frederick B. Flinn of the College of Physicians and Surgeons, New York, as the result of experiments on tissue cultures from living embryo chick hearts, checked up with other animal cells and with one species of primitive one-celled plants.

Prof. Flinn's interest was aroused by the tragic fate of a number of women workers on radium-illuminated watch faces, who suffered breakdown of their bones, particularly of their jaws, from the effects of radium unwittingly taken into their systems.

In his researches, the New York physiologist used chick heart tissues, cultured in the way developed many years ago by Dr. Alexis Carrel, of the Rocke-

feller Institute for Medical Research. Each culture was divided into two halves, one of which was treated with radium in various degrees of intensity, while the other part was kept untreated as a check or "control." The type of tissue chosen was that most early resembling the fibroid or cancerous growths that have replaced healthy bone in the radium-sick patients.

In no case was it found that a radioactive solution, even the weakest, was stimulative of extra growth. Any concentration of radium strong enough to have any effect at all had a slowing-down effect, and above a certain minimum strength they eventually killed the tissues exposed to them.

Dr. Flinn was therefore brought to the conclusion that the replacement of radium-destroyed bone by malignant fibroid tissue was due first to the destruction of the bone-repairing cells, which permitted the decay of the bone and its subsequent failure to re-form even when extra calcium is medicinally administered, followed by the abnormal tissue growth, and frequently by bacterial infection, as the result of the constant irritation which is known to occur at sites of fracture and of greatest bone stress.

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PHYSICS

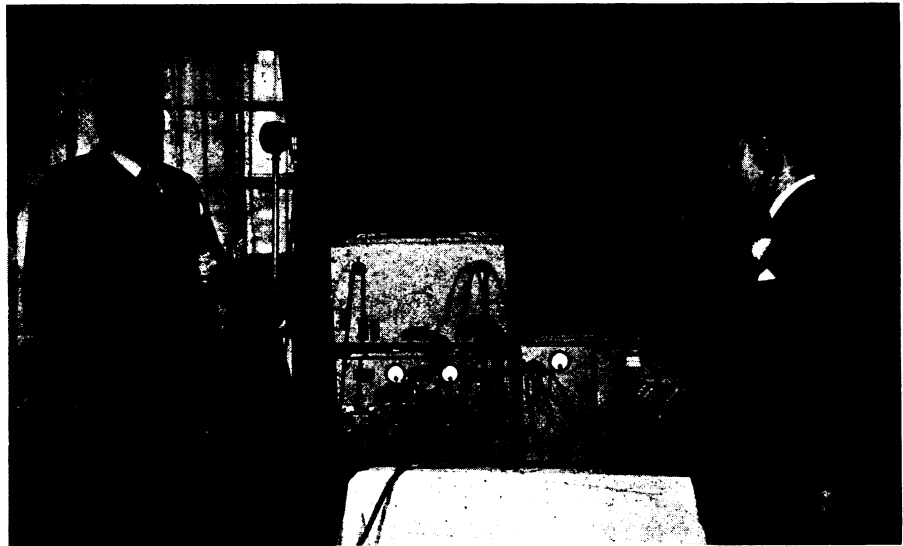
New Apparatus Makes Tests on the Singing Voice

EVALUATION of a singer's voice is no longer dependent on widely variable opinion which the human ear helps to form. Tests by the scientists of the Electrical Research Products, of New York, with special, newly-devised instruments, make it possible to measure acoustically the qualities of a given singing voice. Any voice can be compared with an ideal voice represented by curves already prepared. The ideal voice has the power of Caruso and the other special attributes which all good singers possess in part but none completely.

S. K. Wolf, D. Stanley and W. J. Sette, of the New York firm of electrical consulting engineers, describe (*Journal of the Acoustical Society of America*, April, 1935) how they used automatic high speed level recorders, crystal harmonic analysers and an acoustical spectrometer to study voices.

Over one hundred singing voices were studied in the tests. Of them all, that of Lauritz Melchior, tenor of the Metropolitan Opera Company, was the nearest approach to the "ideal." His voice fitted almost perfectly the ideal reference curves already established.

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THE SHAPE OF A VOICE

Lauritz Melchior, Metropolitan opera star, submits his voice to the consideration of a wholly mechanical critic—and comes out triumphant.

ECOLOGY

Lake Turns to Desert When Unwisely Drained

DESTRUCTION'S course, from lake to sandy desert in the middle of Wisconsin, has been traced by Prof. Norman C. Fassett of the University of Wisconsin.

The region lies in what is known as the "driftless area," a part of the Midwest that was not covered with ice during the Glacial Age, overlapping the adjoining corners of the states of Wisconsin, Minnesota, Iowa and Illinois. It is called "driftless" because of the absence of the "drift" soil produced by the glaciers everywhere else in that part of the country.

Part of the driftless region was occupied during the Ice Age by a great shallow lake, which geologists called Lake Wisconsin, lying in what is now central Wisconsin. Prof. Fassett relates its decline and fall in a single sentence: "The bed of this lake has largely developed into bog; the bogs were drained some 25 years ago, the dry peat burned, and the ashes blew away, leaving a sandy desert."

Into this costly monument to man's bad judgment in land-and-water management, trees and lesser plants have moved. The trees consist principally of jack pine, scrub oak and quaking aspen. The smaller plants have a decided flavor of the Southwest about them: bluestem

grass, prairie clover, false indigo and leadplant. They seem to be making themselves quite at home on the sand.

The driftless area generally has good cornland on the plateau-like tops of its uplands and on the flat bottoms of its ravine-like valleys. The slopes are too steep for cultivation. According to exposure, they bear heavy stands of timber or are covered with prairie grasses. Both timbered and grassy slopes are for the most part over-pastured, so that the natural slow process of erosion has been destructively speeded up.

To the student of nature, the great interest of the driftless area lies in its character as a meeting-place of diverse types of vegetation. Not only are there prairie plants on the exposed slopes, but in the more sheltered parts there are species, such as the Arctic primrose, that are not to be found anywhere else this side of Labrador. Besides these, and constituting the great number of strange species, are plants found elsewhere only in the southeastern United States, especially in the southern Alleghenies.

It appears probable that these plants were there before the last great advance of the glaciers, perhaps longer, and that they lived there during all the centuries of glaciation, an island of flowers in a sea of ice.

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