

## MEDICINE

# Study of Anesthetics Key To Mystery of Life and Death

Knowledge of What Happens To Cells of Body When Acted on By Ether or Chloroform Will Give New Light

**T**HE MYSTERY of life and death may some day be solved by studies of the effect on body cells of the anesthetics now used to bring oblivion during surgical operations, it appears from the presidential address of Prof. William de B. MacNider, of the University of North Carolina, at the Congress of Anesthetists.

Scientists will come closer to understanding this fundamental problem when they learn more about how ether and chloroform and similar substances affect each kind of cell in the body, Prof. MacNider pointed out.

"We possess in the general anesthetics substances which, by their use and through an understanding of what they do and how they do it, come nearer than any other substances to an answer to the question, what constitutes life and what is the basis for a normal type of death dependent upon functional depression with or without structural changes," Prof. MacNider declared.

In order to pierce the mystery sur-

rounding life and death, scientists need to discover first what happens chemically to the body cells when the patient is anesthetized, and then what happens chemically in reverse direction when the anesthetic wears off and the patient regains consciousness. Prof. MacNider described the anesthetic state as a period of depression in which the body cells in large measure are induced to suspend function.

Discoveries which may lead to a new conception of how the tissues of the body recover from injury and how as a result of that recovery they acquire resistance to further injury by the same or similar substances were reported by Prof. MacNider.

Prof. MacNider called attention to two earlier conceptions of how the body tissues recover from disease. One of these was formulated by the great Russian scientist, Metchnikov, who found that the action of certain wandering cells called endothelial leucocytes provided the body with a means of defense against invading cells like bacteria

and also enabled the body to develop resistance to subsequent attacks from these cells. The second theory was a chemical one, formulated by the German bacteriologist, Paul Ehrlich, who found that tissues which were the seat of a disease process produced special chemical antibodies which neutralized or bound the poisons and in that way terminated certain diseases and imparted resistance to further attacks.

## How Injuries Are Repaired

The part played by the fixed tissue cells of the body, such as are found in the skin, the eyes, the liver or the kidneys, in inducing resistance to disease has been investigated by Prof. MacNider. He found that in case of slight injury these cells repair themselves by formation of a normal type of cell having normal function but no resistance to the same kind of injury. But if the original injury is severe, in a certain number of instances the repair process results in formation of an abnormal type of cells, which may or may not have normal functional value. Such cells, however, are not only highly resistant to the chemical substance which caused the injury but to a variety of other chemical poisons.

Study of the role of the fixed tissue cells in giving the body resistance to injury by invading forces is just beginning, Prof. MacNider said. His investigations were made on the liver and kidneys. Their results and implications add further to the knowledge of how the body protects itself against injurious substances.

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## GEOGRAPHY

## "Heroes of the Arctic" Thrilling Drama of North

**I**F American audiences have a chance to see the motion picture record of the Cheliuskin expedition, that thrilling episode in the conquest of the Soviet Arctic, they will witness a drama in which the plot was ordered by nature and circumstance, the actors are real history-makers, fighting for their lives and Soviet civilization, and cameramen had no opportunity for retakes.

At the American premiere of "Heroes of the Arctic" held at the Embassy of the Union of Soviet Socialist Republics, scientists and newspapermen had the privilege of seeing one of the most striking records of exploration ever placed on the screen. (Turn to Page 269)



**SOLITUDE ISLAND**

*The true meaning of desolation was learned by these Soviet explorers at the roof of the world.*

Done with that mass technique peculiar to the art of the new Russia, from the crowds waving "bon voyage" to the greatly multiplied crowds cheering the return of Prof. Otto Yuelvitch Schmidt and his band of heroes, the film record produces a feeling that no Hollywood epic can achieve.

When the ice is seen crushing the side of the good ship *Cheliuskin*, when the bow of the ship in swirling snow upends and then sinks in the ice-covered Arctic ocean, 90 miles from land, leaving 104 men, women and children on the ice, when airplanes in the dead of Arctic winter rescue all safely, the audience seated in warmth and comfort nevertheless are eye-witnesses.

Fortunately, there is no attempt to convert into English the few speeches included. Superimposed titles give the essence, the original sound gives the spirit. It serves a real educational pur-

pose to have Americans realize emotionally that Russian and other foreign languages are in everyday use in their countries.

Disaster so frequently makes news. The Cheliuskin film is remarkable because it has thrills aplenty although the life loss was only one during the whole expedition, a seaman who went down with the ship.

Even more thrilling to those who appreciate economic and geographical conquest is the broad plan for the opening of the long coastline of the Soviet Arctic to economic development and the opening of the Northeast Passage. Rich resources, lumber, oil, furs and minerals are locked by ice in the Soviet Arctic. The Cheliuskin expedition was but an incident in this great development which has made new gains this year.

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the real one but with the new device the position of the mean sun is also shown, by a line of light, and the visitor can see its motion.

There are now eighteen planetaria in Europe, and two in the United States—the Adler Planetarium in Chicago and the Fels Planetarium at The Franklin Institute in Philadelphia. Others are being built in Los Angeles and New York. Neither of the American planetaria is yet equipped with the new attachments.

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#### PHYSICS

### Daily Cosmic Ray Variations Demonstrated

**R**ESULTS of three years of research at the University at Innsbruck, Austria, reveal that there is a daily regular variation in the intensity of the cosmic rays striking the earth. Over 18,000 measurements have been made. The effect has been suspected but until now never proved conclusively.

Dr. Victor F. Hess, working with Drs. R. Steinmaurer and H. Graziadei of the University, will shortly announce to the Vienna Academy of Science that measurements in their cosmic ray meters indicate a daily fluctuation in intensity. The maximum occurs at midday, the minimum between 9 p. m. to 3 a. m. at night.

The cosmic ray station at Innsbruck has been taking cosmic ray measurements continuously since September 1, 1931. Some of the apparatus has never stopped during that time. The station is high in the Tyrol Mountains at an altitude of 2,300 meters above sea level, or well over 7,600 feet. The research program is part of the present worldwide plan to study cosmic rays.

In a preliminary announcement (*Forschungen und Fortschritte, Sept. 1*) Dr. Hess declared:

"It is not to be wondered at that for a shorter series of cosmic ray measurements at lower altitudes the daily change was not noted."

While avoiding a dogmatic assertion that the sun affects cosmic ray intensity, Dr. Hess suggests it would not be surprising if the changes in the magnetic and electric fields surrounding the earth—changing as they do from daytime to night—might alter the part of cosmic rays which is now known to consist of electrical particles.

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#### ASTRONOMY

## See the Meteors in Comfort-- In German Planetarium

**T**HOUGH astronomers may have to wait years before another bright naked-eye comet appears, visitors to the Zeiss planetarium in Jena, Germany, can now see one threading its way through the artificial skies. They can also see a brilliant shower of meteors, or "shooting stars" such as those observed in 1833, in 1866, and early this year from Little America.

The comet machine is a new attachment to the planetarium instrument which projects images of all the stars and planets, visible to the naked eye, on a hemispherical dome above. The comet shown is Donati's, which appeared in 1858, and of which George P. Bond of the Harvard College Observatory made a very complete and accurate series of drawings showing its appearance as it went across the sky. Reproductions of Bond's drawings are used like the separate pictures in a motion picture film, shown successively, and one faded into the next. At the same time, the comet projector turns so that the comet is seen to move through the starry background, from the constellation of Canes Venatici, the hunting dogs, southwards to Scorpius. It requires about five minutes for the comet to run its course, instead of the many weeks that it actually was visible.

The meteor shower projector throws on the dome rapidly moving spots of light, all radiating from a single point, in the same manner as a real one. This is accomplished by a set of rotating circular plates, cut with narrow slits. The method was devised by Dr. Philip Fox, director of the Adler Planetarium in Chicago. When watching it, the meteors seem to appear completely at random, except for the radiation from one point. In a real shower this effect of a radiant is due to the fact that the meteors are moving in parallel paths, and when they enter the earth's atmosphere, to be burned by the friction, their paths seem to converge in the distance, like the tracks of a railroad.

Another new planetarium attachment is a "mean sun projector." The real sun seems to move eastward completely around the sky during the year, but its actual speed varies. As a result, sun dial time is fast at certain parts of the year, and slow at others. Therefore astronomers assume the presence of a "mean sun," which also takes a year to encircle the sky, but moves with uniform speed eastward. Our standard time is based on the passage of this mean sun, sometimes ahead of the real one and sometimes behind.

The planetarium sun moves just like