

SCIENCE NEWS

ICE-BERGS IN THE ATLANTIC

Science Service

ICE-BERGS are now being sighted off the bleak coast of northern Newfoundland, and the U. S. Coast Guard Service, charged with the responsibility of keeping safe the steamer lanes, has begun the annual ice patrol along the edge of the Grand Banks.

Greenland is the native home of the berg. Along those desolate shores they are born, "calved" as the sailors call it, from the great ice cap which covers nearly all of the land with a blanket of ice hundreds or even thousands of feet in thickness, and which flows slowly outwards and downwards to the sea where the dreaded bergs, the greatest menace to North Atlantic shipping, are finally set free to begin their journey of some 1,800 miles to the south.

From their birthplace to their graves in the warm waters of the Gulf Stream, the journey of the bergs is a varied one, depending on the unending conflict between the Labrador Current from the Arctic and the Gulf Stream from the tropics. It lasts a year, sometimes longer, says Lieutenant Edward H. Smith, of the Coast Guard Service, now on board the "Tampa." A third current, the East Greenland Current, setting southwest from the east coast of Greenland, also enters into the game and brings a fair contribution of bergs to mingle with the main supply from Baffin Bay.

Calved in the early summer, the bergs drift over toward the Labrador coast where they are delayed by the winter freezing of the ocean along shore. The following March finds them off the northern edge of Newfoundland, drifting southwards at a rate of about 10 to 20 miles a day. A few drift around the northern edge of Newfoundland into the Gulf of St. Lawrence, a few more drift westwards through the gully along the south coast of that island and between it and the shoal water of the Grand Banks, but most of them keep on along the eastern edge of the banks until off their southern extremity, known to sailors as the "Tail" of the banks, they finally are melted in the waters of the Gulf Stream.

It is along here that they are the greatest peril to navigation, for the tracks of the steamers from North American to North European ports all pass nearby, and it is the duty of the International Ice-Patrol, maintained by the United States, but paid for by all the principal maritime powers, to keep track of the bergs, to warn vessels and to advise when shifting of the steamer tracks to the south is necessary for safety.

While an ice-berg may be seen under the best conditions of visibility by a lookout in the crow's-nest of a liner while 15 miles away, in thick weather or fog it is a different story, Lieutenant Smith says. In dense fog a berg can not be seen further than 100 yards. Even on a clear, starlight night a lookout will not pick up a berg more than a quarter of a mile away, unless he has been warned of its existence and direction, when he may be able with binoculars to see at a distance of a mile the

white streak of the seas breaking along its base. It was on such a night that the lookout of the "Titanic," off the Tail of the Banks, saw a berg just too late for the course of the vessel to be sufficiently altered. With a searchlight a berg may be seen at two miles, and in bright moonlight at five miles or even eight.

BALLOONS IN METEOROLOGY

Science Service

DR. C. L. MEISINGER, storm-riding meteorologist of the U. S. Weather Bureau, has successfully completed the first of his fifteen projected balloon journeys, undertaken to learn more about storms and how they behave. He landed late in the afternoon of April 2 at Walterboro, S. C., after a flight of 22 hours and 20 minutes from Scott Field, Ill.

The flight was terminated because of the simultaneous approach of night and of the Atlantic Ocean which is about 40 miles from Walterboro in the direction in which the balloon was travelling. Walterboro is about 40 miles west of Charleston. The air line distance from Scott Field is about 650 miles. Scott Field is at Belleville, Ill., about a dozen miles east of St. Louis, and the course of the flight was across Illinois, Kentucky, Tennessee and North and South Carolina.

The balloon was piloted by Lieutenant L. A. Lawson, of the U. S. Army Air Service, which is cooperating with the Weather Bureau in the arrangements for these flights. Most of the journey was made at an altitude of from 7,000 to 8,000 feet.

The next flight will be started as soon as the balloon can be taken back to Scott Field and re-inflated. This flight was made in the wake of the storm which brought a record April snowfall along the Atlantic Coast. Others will be started on the front, or near the centers of storms, the purpose of the flights being to study the motion across the country of the great masses of air involved in these disturbances, and to get a "close up" of the storms themselves from the air.

A NON-BOILING STEAM GENERATOR

Science Service

A NEW steam generator, revolutionizing former conceptions of steam engineering, has been given a successful trial at Rugby. It is capable of producing power from coal at an overall efficiency of something like 28 to 30 per cent. This approaches the efficiency of the Diesel oil-burning engine, which is about 35 per cent., and is in contrast to 17 to 18 per cent. efficiency for the most modern station at 350 pounds pressure and 700 degrees Fahrenheit superheat. Its efficiency rivals that of the new mercury vapor boiler recently developed in America.

The generator is the invention of M. Benson, of the Benson Engineering Company of London. Its principle is the production of steam at a pressure of 3,200 lbs. per square inch and at the "critical temperature" of water,

706 degrees Fahrenheit. This is by far the highest pressure ever used in steam production.

The "critical temperature" of any liquid is the temperature above which it no longer can exist as a liquid, no matter how high the pressure. Above that point the whole of the liquid changes suddenly and completely into a gas without alteration of volume. The phenomenon can be observed in a laboratory using liquid carbon dioxide, from which soda water is made, sealed in a thick glass tube and heating it slowly to 89 degrees Fahrenheit, when the whole of the liquid suddenly changes into gas. The application of this principle to water is the basis of the Benson generator, which is described by *Chemistry and Industry* here as follows:

"In the 'Benson' generator water is converted into steam at the critical temperature of 706 degrees Fahrenheit, that is, the whole mass of the water in the coils is bodily changed into steam at the same volume without the absorption of any latent heat, since the volume remains the same. It will be obvious that as no latent heat is absorbed, there is no ebullition or "boiling," that is, the sudden conversion of small particles of water into comparatively large bubbles of steam, the energy required for this increase in volume constituting the latent, or lost heat.

"It is on these highly ingenious lines that the essential trouble of the small-bore coil steam-generator has been overcome, the fact that because of the absorption of latent heat and consequent boiling the water will not remain in contact with the sides of the tube, and the generation of steam is spasmodic and apt to be explosive. The generation of steam at the critical temperature has, of course, completely eliminated this difficulty so that narrow-bore steel coils can be used which will withstand almost any pressure; in fact, the present installation is said to have been tested hydraulically to 6,400 lb. pressure."

SULPHURIZED SANDSTONE

Science Service

SANDSTONE may soon become the competitor of granite for the distinction of being one of the strongest of building materials. Tests made at the U. S. Bureau of Standards show that by the simple device of soaking sandstone for several hours in melted sulphur and then cooling it the strength of the stone is increased from 200 to 300 per cent.

The crushing strength of ordinary sandstone is about 8,000 to 9,000 pounds per square inch. But if it be subjected to the sulphur bath the crushing strength is raised to 30,000 pounds, or equal to that of the best granite.

Sandstone is porous and if it be immersed in melted sulphur, the sulphur soaks in through the pores of the rock. A treatment of several hours is sufficient to impregnate sandstone blocks of the usual building sizes and make them as strong as granite blocks. Sulphur melts at about 240 degrees Fahrenheit. Further heating thickens it, so the sandstone is immersed in the liquid while it is still cool enough to be quite fluid.

Experiments are continuing at the Bureau of Standards

to determine the weathering qualities of the sulphurized sandstone, upon which its use as building material will largely depend. Investigation has also shown that sulphur also has the property of greatly increasing the strength of cement which is soaked in it, and experiments along those lines are being made.

Some of the more important public buildings of Washington, such as the White House and the Treasury, are built of sandstone, which is a favorite material for such work. Its relatively low crushing strength has, however, prevented it from being extensively used in engineering works of a massive character. The investigation so far indicates that if treated with sulphur it may be regarded as the equal of granite for these purposes so far as strength is concerned.

THE EFFECTS OF FAMINE ON THE BODY

Science Service

WHAT long-continued famine does to human beings is vividly shown in the form of a coldly scientific article on the effects of the recent famine in Russia recently published here as a translation from the work of a Russian scientist, Professor Alexis Ivanovsky, of the University of Kharkov. Not only loss of weight, but a shrinking of several inches in stature and a general drying up of the whole bodily frame similar to that experienced in advanced old age was experienced by Russians suffering from a three-year shortage of wholesome food.

When it became evident that a period of famine was approaching in Russia, and that it threatened to be of long duration, Professor Ivanovsky enlisted his colleagues in an investigation of the physical effects of starvation. The observations were made on 2,114 individuals, male and female, in all parts of Russia, and were continued for three years, each individual who survived being measured six successive times at intervals of six months.

The most universal and obvious effect of the famine was loss of weight. Not one individual was found whose weight had not diminished, while in a great number of cases the loss was as much as thirty per cent. of the normal weight. Fat was the first to be sacrificed and by the end of the famine had almost completely disappeared in all the subjects measured. After that was used up, the muscles wasted away, then some of the internal organs such as the liver or pancreas were affected, while the essential organs such as the heart and the central nervous system were little affected.

Bodily stature declined in nearly all cases, the average loss being from 1.5 to 2.6 inches in men, and from 1.4 to 1.9 inches in women. The loss was greater among young persons, but was made up by them more rapidly when food again became adequate.

The shape of the head changed. In the average famine sufferer it became relatively broader, the front and back diameter shrinking more than the transverse. The length of the face decreased less than its breadth, resulting in a typically lean, narrow visage. Similarly the nose became narrower and thinner.

"In very emaciated people," Professor Ivanovsky states, "the hair grew more slowly, fell out prematurely,



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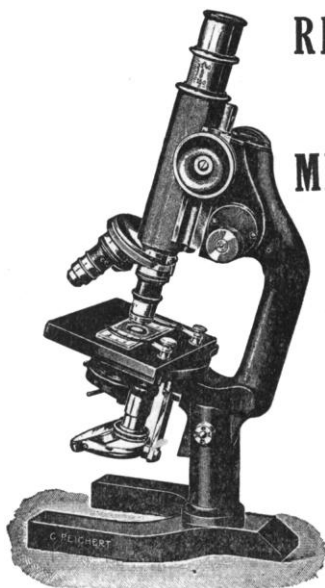
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and tended rapidly to become gray. The eyes became like those of old people, the skin lost its elasticity and became wrinkled, the gait became weak and uncertain, the body bent. The sexual instinct became very weak or even disappeared entirely. The number of births decreased enormously, while the number of children born prematurely or still-born increased, as did those born with various deformities."

Because of the irregular diet of indigestible food, ulcer of the stomach became a common complaint. The body largely lost its power of resistance, simple boils easily became carbuncles, and abscesses of the hands were common as the result of ordinary infections. Finally, Professor Ivanovsky considers the psychological factors of depression and apathy to have been of great influence, even to the extent of causing changes in the body structure.

ARTIFICIAL CELL CULTURE AND CANCER

Science Service

By growing cells outside the body for many years in his research laboratories at Washington University School of Medicine and the Bernard Free Skin and Cancer Hospital, St. Louis, Mo., Dr. Montrose T. Burrows is gaining new light on the cancer problem. His apparatus makes it possible to keep cells alive, active or growing for an indefinite number of years, and it was devised as a means of finding out why some cells continue their normal existence and why others suddenly change their nature and grow, forming cancers.

He has found that cells normally form a substance which, if present in sufficient amounts, will cause them to grow or migrate. If the circulation is too fast, this substance is removed before the cells have undergone its effect; but if the circulation is slowed up, growth or migration occurs. This explains why a well-exercised muscle gets hard and larger, because the contractions of the muscle cause momentary interference with the circulating blood and retains the substance long enough to cause the muscle to grow in size.

Louis H. Jorstad, who has been assisting in this work, found that coal tar has the power to attract cells away from their normal blood supply sufficiently to cause them to grow and multiply. These cell clumps thus formed enlarge and soon are perceptible as tumors of a cancerous nature, and can be transplanted into other animals for an indefinite number of generations. It is only when there is a clump of cells so affected by impaired circulation that the growth-producing substance can act.

In the medical world old age is noted for its defective circulation and cancers. Dr. Burrows has demonstrated that if an extract of a cancerous tumor is injected into skin which has its circulation impeded in a manner similar to that of old age, a cancer forms. Cancers frequently occur in pigmented warts or moles when their already deficient circulation is interfered with by natural changes of old age. Their exposed location predisposes them to irritation and injury which may be sufficient stimulation to cause a rapidly spreading cancer. Medical science has been groping for the cause of cancer for hundreds of years and has been unsuccessful in ade-

quately coping with it because the cause was unknown. Since this discovery that cancer may be produced by anything which causes a rearrangement of cells in the presence of a defective circulation, it is possible that medical science will soon find methods of administering its most effective treatment and prevention.

ITEMS

Science Service

THOMAS A. EDISON, "the father of the electric lighting industry," has accepted the honorary chairmanship of the National Research Council Committee on Industrial Lighting, which is now being organized to conduct an extensive investigation of the relation of illumination to industrial production and the reduction of industrial fatigue. This scientific investigation plans to increase production and decrease rejections of manufactured products, to better working conditions through the decrease of industrial fatigue and the increase of safety measures and compensation, and to conduct an educational campaign urging better lighting. In administrative charge is a general directive board with Professor Dugald C. Jackson, of the Massachusetts Institute of Technology, as chairman. Present plans contemplate a two-year program and an expenditure of approximately \$50,000. Test installations will be made in large manufacturing establishments in the principal industries, including the boot and shoe, textile, printing, clothing manufacturing and other industries. The field work will be supplemented by laboratory research under controlled conditions in the illumination research laboratories at the Massachusetts Institute of Technology.

WHEN an animal eats, its whole body is nourished by the food that is absorbed at any one point. This is far from being the case with woody plants, however, according to research at the Maryland Agricultural Experiment Station. Dr. E. C. Auchter has found that "the mineral nutrients absorbed by the roots on one side of a plant are in a large measure translocated to and used by the trunk, limbs and leaves directly above them." In the experiments on which this conclusion is based, Dr. Auchter discovered that if fertilizer was applied around only half the base of a tree, the twigs on that side only showed any benefit from it. When nitrate of soda was applied to half the roots, the leaves above these roots were shown by chemical analyses to have gained in nitrogen content. On the other side of these trees the leaves showed no increase in nitrogen content, and sometimes actually decrease.

MOST of us are inclined to think that the skin is a great protection against the absorption of poisonous substances. Surgeons for example often scrub their hands with bichloride of mercury solutions and put on rubber gloves with out bothering to dry the hands. Bichloride poisoning might be acquired in this way. Other poisons are sometimes absorbed through the skin. For instance, a Philadelphia painter spilled a large quantity of wood alcohol over his clothing by accident and became blind. The doctors say the wood alcohol went through the skin into the blood and was carried to the optic nerve and so did the damage.