SCIENCE NEWS

Science Service, Washington, D. C.

ADRENAL GLAND SECRETION AND BODY HEAT

THE mechanism by which the body keeps warm has received a new scientific explanation. Dr. Charles E. de M. Sajous, professor of endocrinology at the University of Pennsylvania, thinks that adrenin, the substance secreted by the adrenal glands, small organs just above the kidneys, plays an important part in the production of body heat.

Physicians and biologists have known vaguely for years that heat is released by some process of union of the body cells with the oxygen of the air through the action of the blood in the tissues, but just what chemical changes are involved has remained a mystery.

Dr. Sajous believes that adrenin is carried to the lungs where it takes up oxygen and is then absorbed by the red corpuscles of the blood and transported to the tissue cells. Here the complex chemical compounds that originate in the glands react with the partially digested food products to produce heat. This enables the enzymes or ferments present which are very sensitive to heat to complete the digestion of the food products, rendering them available for the work each tissue carries on.

This heat action must be so controlled as to avoid excess heat, since any rise above 98.6 degrees Fahrenheit, the normal temperature of the body, means fever. Any excess is normally prevented by the glandular substance cholesterol, while adequate production is assured by thyroxin, from the thyroid gland of the neck, which also acts as a stimulus to the gland product lecithin, the heat producer.

The beneficial effects of light and heat treatments, such as ultra-violet and Roentgen rays, are due to their speeding up of this physiological process. This heat energy, by increasing the activity of the enzymes present in the tissue cells, enables them to break down the disease-causing germs and the toxins they produce. Treatments with light and heat radiation are beneficial up to a certain limit, but care must be exercised that they do not increase the body temperature beyond this point.

"TOXAMINS" ATTRIBUTED TO OATMEAL AND BREAD

VITAMINS, the group of beneficial though little-known substances found in certain foods, have a family of evil-doing opposites, according to Professor Edward Mellanby, F.R.S., of Sheffield University. These malignant twins of the vitamins he has christened "toxamins," and he claims that they exist in greatest concentration in the foods that are used as the principal elements of diet by large sections of the white race. The most notable offenders in harboring his newly discovered causes of ill-health, he says, are oatmeal and wheat. The principal effects of the presence of toxamin so far investigated are prevention of proper bone formation, and in some cases serious nervous disorders.

The harmful effects of oatmeal and other cereals on the development of bone can be reduced if the cereals are allowed to germinate for some days and are then heated at boiling temperature for eighteen hours. Both germination and heat are necessary for this purpose.

The scientific reason for spreading butter on our bread is that apparently the harmful effect of the toxamins in cereals is counteracted by the fat-soluble vitamins which are present in the butter.

The troubles which vitamins act to prevent and cure have long been regarded as being due merely to a lack of the proper vitamins in the diet, so that these diseases, such as rickets and beri-beri, have come to be known to physiologists as "deficiency diseases." If Professor Mellanby's claims are confirmed by later investigation, an entirely new aspect will be placed on this whole series of ailments, since their causes will be transferred from a merely negative category to a group of really positive evils. Many physiologists and physicians are still doubtful of the genuineness of the new discoveries, and the subject is one that is likely to be much controverted for a time.

CANCER SERUM TESTS

CANCER serum that has cured cancer in a number of laboratory rats and has rendered them immune to the disease over a long period of time, is the latest cancer news just reported by Dr. Thomas Lumsden, working at the Lister Institute, under a grant from the British Empire Cancer Campaign. Dr. Lumsden has been working for several years on the possibility of serum treatment.

In recent experiments he has fought cancer cells with a number of different anti-sera in an attempt to find out which would be the most effective against the malignant cells, and also in the hope of learning the mechanism by which immunity to cancer is acquired.

Fifty rats, all of them with a cancer in each hind foot, were used in one series of tests. Anti-serum of a rat or mouse cancer was injected in one foot of each rat. In every case the cancer of the treated foot was cured, and in addition the untreated tumor in the other foot also went away a few days later.

Dr. Lumsden had previously reported that rats treated in this way "were found to be absolutely immune to the tumor concerned."

"It is now possible to state," he says, "that this immunity is of long duration. A test inoculation was given to fifty rats six months after their recovery. Of these, only two developed progressive tumors. The other forty-eight were still completely resistant to a cancer which grew rapidly in all of twelve normal animals inoculated with identical material at the same time."

Recent efforts to go further and use serum to fight human cancer are described in a report from Professor Ferd. Blumenthal, of the University of Berlin.

Professor Blumenthal long ago proposed that cancer patients might be injected with an extract of the tumor

removed by operation, in order that they might become immunized. This method has lately been taken up with success by Dr. Thies. The chief drawback in this method is that a cancer used for this purpose must not be advanced in decomposition. This means that only a few operative cancers are adapted to this treatment.

MAPPING THE OCEAN BOTTOM

A CHART of the bottom of the sea, automatically and continuously drawn during a voyage, is now available to the Navy as a result of the work of Lieutenant Leo P. Delsasso, U. S. Naval Reserve. On shore Lieutenant Delsasso is physicist at the University of California, Southern Branch. Information received from the Navy Department tells of elaborate tests of his new automatic depth-sounder conducted on board the *U. S. S. Maryland* on its trip to Australia.

The apparatus follows previous development in the idea of sending a sound impulse at high speed from a ship to the ocean bottom, and calculating by the time of the return echo how deep the water is. Heretofore it has been necessary for an attendant to watch operations and make constant readings and calculations to be sure of safety.

The Delsasso apparatus, employing vacuum-tube amplification along with marking devices, yields a chart which not only advises the navigator of the depth at a given time, but shows gradients, approach or recedence of shallows, and in general gives warning of anything untoward in the briny depths.

It is hoped that further improvements may enable the apparatus, built in more rugged form, to be placed on the bridge for convenient use of the skipper. Had such a device been available on the U. S. destroyers, the Honda disaster could have been avoided. In this accident several vessels were beached after a blind run through water whose shallowness would certainly have been reported by the depth-sounder.

Any solid surface of considerable size, directly facing the vessel at right angles to the line of oncoming sound, will report its presence to the depth-sounder. The object does not have to be directly beneath. Thus a whale for a moment might startle a navigator into thinking he was in shallow water. Lieutenant Delsasso unfortunately had no opportunity to use his device in determining the proximity of either whales or icebergs. The latter case particularly calls for further investigation.

ELECTROLYTIC IRON

DISCARDED tin cans and automobile bodies, as well as other forms of iron which now go to waste on dump heaps, may be an important source of a very pure form of iron in the future, according to the Engineering Foundation.

Twenty million tons of iron are said to go to waste annually because of rust, but this can be greatly reduced by the use of this iron, which scores even higher than a popular brand of soap, for the iron obtained by these electric methods is 99.96 per cent. pure.

It is called electrolytic iron, and a plant has been established at Niagara Falls to produce it as a result of cooperation between French and American inventors. While the first electrolytic iron was produced half a century ago in America, the original product was so rough and brittle that nothing much could be done with it. Scientists in many countries had been working on it, the greatest success being attained in France and in the United States. Then it was found that the firms in each of these countries had knowledge and patents which were valuable to the other, so they combined forces.

The method consists in using bars of cast iron as anodes of huge wet batteries, the liquid being a solution of iron chloride. The cathode, the other terminal of the battery, consists of a bar of steel, and when the current is passed through, the iron dissolves from the cast iron bar into the liquid, and at the same time is deposited from the solution onto the steel bar.

The iron deposited on the steel bar forms a cylinder, up to a quarter of an inch thick. The metal, on the inside, next to the steel, which is deposited first, is full of hydrogen, which makes the iron brittle, but this gas is removed by passing the cylinder through an oil-heated furnace. A stripping machine is used which enlarges the diameter of the iron tube, so that it may be slipped off the steel cathode, which is used over and over again. The tubes may be used as they come from the machine for some purposes, or they may be flattened, or slit and made into plates from which other iron objects may be made.

Since only iron is deposited by this process, it is suggested that waste iron from dump heaps might be reclaimed by dissolving in the iron chloride solution and recovering it electrolytically.

AUGUST METEOR SHOWERS

ONCE again the August meteor shower is starting, and on August 10 and 11 the display should be more than usually prominent, for on these nights the moon will be just past new. It will therefore set early, and the meteors will flash brilliantly against a dark sky background.

These meteors move in a swarm around the sun, and in July and August the earth reaches the part of its orbit which crosses the path of the meteors, reaching the thickest part of the swarm about August 10. The meteors are all in rapid motion, so when they encounter the earth's atmosphere the friction causes them to heat up and glow, and perhaps leave a luminous trail in their wake.

When they come near the earth, the meteors are moving in practically parallel paths and, as these paths seem to converge in the distance like a railroad track, they seem to radiate from one point in the sky, called the radiant. In the case of the August meteors, this radiant is in the constellation of Perseus, therefore the shower is referred to as the Perseids. Another name for them, though not a scientific one, is the "tears of St. Lawrence"; for August tenth is his feast day and the anniversary of his martyrdom, which occurred in 258 A. D.

Perseus rises in the northeast about ten o'clock in the evening, and this part of the sky should be watched for the shooting stars. Bright meteors may easily be photographed. All that is needed is to point the camera at the northeastern sky, then open the shutter and leave it for perhaps half an hour, and if a meteor crosses the sky in this time it will appear on the developed film as a long streak of light. Owing to the motion of the earth, which makes the stars, like the sun, seem to cross the sky from east to west, all the stars will move during the exposure and will appear on the negative, not as points of light, but as streaks. The streaks from the stars, however, will all be parallel, and probably much shorter, than a meteor trail.

Such pictures might even have scientific value, for Dr. Willard J. Fisher, of the Harvard College Observatory, is making an exhaustive study of meteors, and has been considerably aided by such amateur exposures.

"To make a useful record," says Dr. Fisher, "write down the standard times of opening and closing the shutter, and a statement of the place where the exposures were made, exact enough to locate it on a good map. The negatives, not prints, would be gladly received at the Harvard Observatory, where they would be searched. Do not depend on your own searching of the plates; for even if they do not seem to show any meteor trails, experienced observers may find something."

SWEETENED LEMONADE

PATRONS of soft-drink counters have noticed that fresh lemonade, made directly from the fruit and cane-sugar, is sharper and sourer than the "ripened" variety which has been stored for a few hours before use. In their care to issue only a fresh sanitary beverage the dispensers are thus fostering excessive sugar consumption, already a national evil.

Experiments by Miss Edna M. Koster working in the biochemical laboratory of the Southern Branch of the University of California indicate that within an hour and a half practically all the cane-sugar in lemonade disappears, and in its place there comes a much sweeter mixture of the two simpler sugars glucose and levulose. It is probable that this action is the cause of the greater sweetness of the older beverage. The levulose is the principal sweetener, but recent experiments in another laboratory indicate that glucose, long rated at a low value, is not far behind cane-sugar in actual power to sweeten a complete food product. The mixture of the two sugars is accordingly much ahead of the common sugar of trade.

This process of sugar transformation, well known to syrup manufacturers under the name of "inversion," is virtually the same as the process of digestion in the stomach. In the case of lemonade the high content of citric acid takes the place of the hydrochloric acid which engineers the digestive process.

Obviously the sweetening of lemonade by mere lapse of time is entirely harmless. In fact the resulting beverage, being partially digested, is even more readily assimilated than fresh sugar. Furthermore, the citric acid, itself very beneficial, does not seem to suffer in the process which it promotes. No yeast or other outside organism is needed, and the process bears no direct relation to fermentation or alcohol production.

ITEMS

A CHROME ore deposit, said to be the largest known in the world, has been discovered near Columbus, Mont., on the edge of Yellowstone National Park. Professor James F. Kemp, of Columbia University, New York, after a close scrutiny in company with representatives of the U. S. Geological Survey, announced that the find is of importance to the metal industry of the world not alone because of the well-known rust-resisting properties of chromium steel alloys, but also because chromium is rapidly supplanting nickel in the electroplating industry, its only disadvantage having heretofore been its higher cost. Practically all the chrome ore used in this country previously has been mined in Rhodesia, South Africa, selling in this country at about 40 dollars per ton. The Montana ore, after being refined at smelters and chemical plants now being erected, can be sold at about 20 dollars per ton.

THERE is gold in sea water, but it will never make any one rich. Professor Fritz Haber, the German chemist known for his researches on this subject and also for his contributions to agriculture in making possible the capture of nitrates from the air, warns possible investors against plausible schemes for boiling the wealth of Croesus out of the ocean. Gold in exceedingly minute quantities is found everywhere in the oceans of the world, but curiously enough the water and the floating ice near the North Pole assay about four times as much as water from the warmer portions of the globe. The average concentration of the precious metal in the 5,000 samples analyzed by Dr. Haber is only about one one hundredth of a milligram, or three one millionths of an ounce, to the ton; so that he has characterized an attempt to recover paying quantities of gold from the sea as "a search for a very small and doubtful needle in a very large haystack."

RURAL malaria is at last getting as much attention as that that prevails around large centers of population, and practical methods for extensive control in large areas have begun to materialize. The campaign against the mosquito in the country has been greatly aided and abetted by the malaria field station at Leesburg, Ga., established by International Health Board of the Rockefeller Foundation. Here, members of the board's own staff, state health officers and men on fellowships from foreign countries can get first-hand practical contact with the whole broad problem of malaria prevention. The mosquito-carried plague exacts a heavy toll from many countries besides the United States. From $250,000,000 to $300,000,000 is the bill the British Empire has to pay for sickness and death due to malaria according to an estimate by Dr. Andrew Balfour, director of the London School of Hygiene and Tropical Medicine. To the total of two million lives lost a year throughout the world is added the incalculable loss in diminished industrial efficiency due to "chills and fever."