SCIENCE NEWS

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PAPERS READ BEFORE THE INTERNATIONAL PHYSIOLOGICAL CONGRESS

EXPERIMENTS on turtle hearts indicate that this organ will select alcohol and reject nutrients derived from meat when given a choice. The researches in question were reported by Dr. L. D. Seager and Professor W. E. Burge, of the University of Illinois. Turtle hearts were chosen for the experiment because they stay alive for many hours after they have been removed from the bodies that once housed them, beating practically in normal fashion. They were given a synthetic "blood" containing necessary nutrients. These consisted of aminoids and amino-acids, substances known to chemists as the "building-stones" of proteins. Some of the hearts received nothing but these nutrients, some the nutrients plus alcohol and a third group nothing but alcohol. The hearts receiving the "mixed" ration made use of most or all the alcohol, rejecting part of the protein fractions, while the hearts kept on a diet of alcohol only used up all of it.

The enzymes, or digestive juices, of animals and even of the larger plants are easy to extract, and physiologists have worked with them for a long time. But the enzymes of such exceedingly minute things as bacteria have so far proved impossible to isolate. However, Professor E. Gordon Young, of Dalhousie University, has succeeded in getting germ enzymes, not by squeezing but by freezing. He took a considerable quantity of one type of the common colon bacillus, and subjected it to repeated freezings and thawings. This killed the cells and allowed their enzymes to come out, and subsequent filterings removed the extract from the débris of the dead cells. He was then able to test their digesting powers on various nutrient media.

Without green vegetables even a diet rich in vitamins A and B, hitherto supposed to be the indispensables in blood-making, will not prevent the onset of anemia, according to Dr. A. Zih, of Debrecen, Hungary. Dr. Zih fed rabbits on a balanced diet, including the necessary vitamins, excluding, however, fresh vegetables. They developed anemia. He then gave them green grass, and the anemia was arrested. Dr. Zih obtained the same results with chlorophyll, the stuff that makes green leaves green, when he gave it to his rabbits instead of grass. This would seem to indicate that the chlorophyll, or some part of it, plays an essential rôle in the formation of red blood corpuscles.

The secretion of the thyroid, the highly important shield-shaped gland in front of the throat, whose over-development constitutes goiter, plays a notable part in the development of color in the feathers of birds, according to Dr. Boris Zavadovsky, of Moscow. In one series of experiments he fed a tenth of a gram of thyroid a day to young chickens. This brought on the development of color in their feathers; but when the dose was raised to half a gram a day the process was reversed and depigmentation set in. In other experiments, young male birds developed new feathers of "female" shape on plucked areas; that is, the new feathers had rounded ends like hen feathers instead of the pointed tips characteristic of cockerels. But, in sexually immature pullets and in castrated birds of both sexes, thyroid dosing caused the development of feathers colored like those of the male.

While controversy in this country has risen high over the advantages and drawbacks of iodized salt and iodized drinking water, Finland has developed a method of dealing with its goiter problem that seems to offer multiple advantages. The more indirect method of getting iodine into the human system by feeding a weak iodized mixture of mineral salts to farm animals has been attended by considerable success, according to Dr. George Von Wendt, of Helsingfors. This method seemed especially promising, he pointed out, in a dairy country like Finland where the consumption of milk and milk products is very great. When a goiter survey was made, however, it revealed the fact that the affection was very common in domestic animals, particularly in pigs and horned cattle. "In districts with much human goiter," declared Dr. Von Wendt, "only a few of the calves were without goiter. On one of the greatest estates for experimenting we found 72 per cent. of the calves with goiter before administration of the iodized mineral salt. After a year of application to the milk cows the number decreased to only two per cent." Half a year's feeding of the iodized mixture was also observed to have a beneficial effect on the rate of calving in previously sterile cows.

NEUJMIN'S COMET

THE celestial object discovered by Dr. G. Neujmin, at the Simeis Observatory in Russia, on August 2, is really a comet that approached closest to the sun during the past spring and is now receding to the outermost parts of the solar system. These calculations, announced by Professor A. O. Leuschner, professor of astronomy at the University of California, demonstrate definitely its cometary character. At first it was supposed that the object might be a tiny planet or asteroid.

In the meantime, observations made at the Lick Observatory, on Mt. Hamilton, by Drs. C. J. Krieger and N. T. Bobrovnikoff, have shown the object to have a sharp nucleus like a star, but to be surounded by a small nebulosity. This also shows it to be a comet.

According to the calculations of its path, Neujmin's comet reached perihelion, the time of closest approach to the sun, on April 16, when it was 200 million miles away from the sun. However, Professor Leuschner points out that these figures are uncertain, because of the inconsistency of some of the observations. The comet is still of about the fourteenth magnitude, and is slowly moving from the constellation of Aquarius into the neighboring one of Capricornus. Both of these are in the southeast evening sky.

While observing the comet, Drs. Krieger and Bobrovnikoff discovered another strange object close to it, moving

in the same general direction, but much fainter. In the opinion of Dr. J. H. Moore, of the Lick Observatory, this is probably an asteroid, a member of the large family of tiny planets, some only a mile or so in diameter.

THE CRYSTAL CLOCK

A CRYSTAL of quartz, similar to those used in radio stations to keep the wave-length constant, may make possible a new era of accurate clock making. Experiments at the Bell Telephone Laboratories, New York, by Dr. W. A. Marrison, have shown that such a crystal may be made to perform the work of a clock pendulum. Already he has constructed a timepiece that compares in accuracy with the very best of observatory clocks until a few years ago. Since a pendulum is not required, the crystal clock does not require the firm pier on which observatory clocks must be mounted. The crystal clock could be used in a tall office building, on shipboard, or even in aircraft if needed.

When a quartz crystal, properly cut, is placed between two metal plates, and a vibrating electric current applied to them, the crystal can be made to oscillate at a certain rate. By varying the size of the crystal, the rate at which it vibrates can be regulated, and the crystal maintains the same rate with great accuracy. This is used in crystal controlled radio stations.

But a much higher accuracy is needed for a laboratory standard, and this has been attained by Dr. Marrison. His apparatus has been developed primarily as a standard of frequency. The application as a clock is a by-product, but one which may eventually prove of even more practical importance.

Three crystals are used by Dr. Marrison, each vibrating 100,000 times a second. Each crystal is enclosed in a thickly padded chamber to prevent temperature changes and the whole is covered with a glass bell jar, so that the air pressure and humidity may also be kept constant. Three separate oscillating electric circuits from vacuum tubes keep the crystals running, so from each unit there comes an alternating electric current, changing exactly 100,000 times a second. Any one of these three crystals can be connected with the clock, through the medium of another electrical circuit called a "submultiple generator," also using vacuum tubes. One of these takes in the 100,000 cycle current and gives out current alternating 1,000 times a second. This current operates a motor, geared to the clock face in such a way that it keeps accurate time when the crystal vibrates accurately. A contact on this clock gives an electrical impulse every second.

Though the clock has not been running long enough to check its accuracy over long periods, shorter observations show it to keep a constant rate within about a hundredth of a second a day. This is comparable in accuracy with the Riefler clocks that were the most accurate available until a few years ago, and which are still used as the U S. Government standard in Washington. A new clock recently developed in England, however, known as the "Synchronome," is still more accurate, and is now coming into extensive use in observatories and laboratories. Dr. Marrison hopes by future refinements to be able to make the crystal clock as accurate.

ADJUSTABLE PROPELLERS FOR AIRCRAFT

PROPELLERS for airplanes, made adjustable so that their pitch, or "pulling power," can be adjusted in flight as the occasion arises, will soon come into extensive use, is the opinion expressed by engineers attending the Aeronautic meeting of the Society of Automotive Engineers at Cleveland. Two separate papers were presented on the subject. One was by T. P. Wright and W. R. Turnbull, engineers of the Curtiss Aeroplane and Motor Co., the other by Frank W. Caldwell, chief engineer of the Standard Steel Propeller Company. All three agreed that the controllable pitch propeller is well worth the added cost for many types of airplane.

The propeller acts in the air like a screw in wood, and its pitch is the same as the pitch of a screw. That is, it is the distance that the screw will advance when turned once. As the air is a less substantial medium than a piece of wood, however, the propeller slips a bit, and the practical pitch is somewhat less than what it would be theoretically. The greater the angle the blades of the propeller make with the path in which they turn, the larger is the pitch. All present-day propellers in general use are of fixed pitch; they can not be changed while the plane is in the air, though some can be adjusted between flights.

In such a propeller, said Mr. Wright and Mr. Turnbull, "assuming good design, the propeller will be just right for the case of top-speed level flying. and full-open throttle, with the engine running at its normal rated number of revolutions per minute and the efficiency of the propeller will be the maximum for this one condition of flight. For any other condition of flight, the propeller will be less efficient and the over-all efficiency of the airplane will decrease, and, under some conditions, to a very considerable extent."

Various methods have been tried for controlling the blades, but the best type is one in which a small electric motor, operated by a storage battery, is geared to the propeller and controls it. It was predicted that it could be designed so that the weight of the rotating parts would be no more than 20 to 30 per cent. greater than with ordinary propellers. This electric control makes possible a close control of the angle of the blades.

"If the added weight can be kept reasonably low, the great advantages in performances resulting from the use of a propeller that will give good efficiency at all conditions of flight and also allow the full power of an engine to be delivered when most needed will offset many times the disadvantages of a heavier propeller," they said.

Gearing of aircraft propellers was another problem to engage the attention of the engineers. Mr. Wright and his associate, R. E. Johnson, stated that the use of gearing to reduce the speed of the engine as applied to the propeller will come into wide use in heavy multi-engined transport planes. On lighter engines, giving less than 400 horse-power, and in airplanes weighing less than 4,000

pounds, their experience has shown that the gain in performance with gearing is not worth the added weight.

TRACES OF RADIUM

RADIUM, in almost infinitesimal amounts, is to be found in all living plants and animals. It is gathered up by them and concentrated from its even thinner distribution in natural soils and waters. This is the claim advanced by Professor V. J. Vernadsky, member of the Russian Academy of Sciences, after investigations conducted at the Russian State Radium Institute and the Biogeochemical Laboratory.

Surface water from a freshwater pond tested at the laboratory showed the presence of radium in almost inconceivably small amounts. Its concentration would be represented by the fraction 68/100,000,000,000,000, or 68 one-hundred-trillionths of one per cent. A sample from a deeper part of the pool contained somewhat more.

But two species of floating duckweed scooped off the pond's surface showed the presence of 39 one-hundred-billionths of a per cent. of radium, or over 56 times as great a concentration as was found in the water, and this in spite of the fact that over 90 per cent. of the plant itself consists of water. Different species were found to have characteristic concentrations of radium peculiar to themselves.

Tests of land plants and water animals showed rather less radium than was present in the water plants. In them the average concentration was of the order of one one-hundred-billionth of one per cent.

ITEMS

THE elimination of certain poisons from the system, normally the task of the kidneys, can be imposed on the sweat glands of the skin when the kidneys are afflicted with nephritis, putting them out of commission. Dr. Frederick M. Allen, of Morristown, N. J., has used a dry heat treatment on his patients to induce this health-restoring perspiration. Harmful protein compounds are reduced by this means, and abnormal conditions due to the presence of too much water in the body are also corrected. Blood-pressure is but little affected, but it is necesssary to exercise a certain caution in administering the treatment to cardiac patients.

DEMONSTRATING the much-mooted effect of moonlight on starch by means of a chemical trap to catch a shadow was the feat reported before the meeting of the British Association for the Advancement of Science by Miss E. Semmens, of Bedford College, London. Miss Semmens has for some years been studying the effect of polarized light on starch solutions, which it is claimed are turned into sugar by prolonged exposure. Moonlight is composed largely of polarized sunlight, and it might be expected that it would have an effect on suitably prepared starch. Miss Semmens dipped slips of paper into starch solutions and exposed them to moonlight, covering parts of them with small opaque objects to cast shadows. Then she dipped the paper into an iodine solution, which, as is well known, turns starch black but leaves sugar colorless. Where the shadow had fallen, there was a faint but distinguishable deepening of the color, indicating that sugar had been formed in the uncovered part. She was also able to repeat the same test with leaves containing starch grains.

A MAN'S puzzlement over a fence post which he had painted black but which turned white every night was the starting point of a program of research which has culminated in the discovery of a number of chemicals having this remarkable chameleon-like property scientifically termed phototropy. Information regarding these chemicals has now been made public by the American Chemical Society. The famous fence post was painted with a "pigment having a zinc basis." It would turn black soon after sunrise each morning, only to turn white again when darkness came. Many explanations have been given for the phenomenon, but scientists are not yet agreed as to the cause of it. They have, however, found several other substances besides the zinc sulphide, which was in the paint on the post, that will also change color with the light. Most of the known phototropic liquids are solutions of colorless derivatives of certain dyes. The solutions are practically colorless in the dark but turn the color of the parent dye when exposed to light.

THE danger of introducing new plant-killing pests and diseases on imported nursery stocks has led the U. S. Department of Agriculture to place an embargo on the importation of Mahaleb cherries, Myrobalan plums and other fruit stocks. The decision was made as a result of a conference on July 19, but has just now been promulgated. The two stocks principally affected are widely used in the propagation of cherries and plums, and have been imported in large quantities. Domestic producers declare their ability to maintain a sufficient supply to take care of the domestic demand. The embargo will go into effect on July 1, 1931.

STATION W3XK, of the television laboratory of Dr. C. Francis Jenkins in Washington, is now being operated with new equipment and increased power. Up to the present this station has been using 250 watts in the transmitter at the Washington laboratory. The new station, in one of the suburbs of Washington, uses 1,500 kilowatts at present. The Radio Commission has approved a power of 5,000 watts. Radiomovies are now being broadcast every night from the station, between the hours of 8 and 9 P. M., Eastern Standard Time. One room has been provided at the new station for a television studio, from which broadcasts of living subjects will be made, when the equipment is completed. Airplane television broadcasts will be attempted from the new station before long, according to Dr. Jenkins. He has received a new Stinson airplane from the factory and is equipping it with a television camera which will operate through a hole in the floor of the cabin. The scene will be transmitted by radio to the station on the ground, where it will be picked up and rebroadcast with greater power. In this way scenes of Washington from the air will be sent out over the country.