SCIENCE NEWS

Science Service, Washington, D. C.

SYNTHETIC SUGAR

AN approximation of the process whereby living plants produce sugar from water and carbon dioxide, using the energy of light to make the combination, has been accomplished in the laboratory of Professor E. C. C. Baly, of Liverpool University. Using the most elaborate precautions against contamination of either his materials or the glass vessels used in the experiments, the British scientist and his associates have repeatedly produced substances that pass all the chemical tests for sugars.

The first tests were made with the invisible ultra-violet light as the source of energy. In these experiments, finely powdered iron and aluminum compounds were introduced into the water. These took no part in the reaction, but acted as catalysts, or chemical go-betweens, furnishing a large spread of surface on which the chemical action could take place.

But in nature the formation of food substances by plants is carried on by the power of visible rather than invisible light. The experimenters, therefore, sought a closer artificial approach to natural conditions. Since leaves have colored substances in them, colored catalysts were sought for the sugar-formation going on in the glass tubes. For this purpose carbonates of cobalt and nickel, both of which are colored salts, were found useful. With these in the tubes exposed to visible light from electric lamps, the carbon dioxide and water produced the sugars quite as readily as they came into being with colorless catalysts under ultra-violet light.

To the objection advanced by some critics that the sugars would be formed by combination of the gas and water in the dark, Professor Baly answers that he tried this over two hundred times, and that the results were always negative.

LUMINESCENCE FROM CATHODE RAYS

"ICE" of frozen nitrogen gas, which becomes solid at a temperature of 166 degrees below zero, Fahrenheit, glows with a brilliant greenish light under the influence of cathode rays. This is one of the results obtained by Professor J. C. McLennan, of the University of Toronto, in experiments made with the cathode ray developed recently by Dr. W. D. Coolidge, of the General Electric Co.

Professor McLennan and his associates previously made experiments with solidified nitrogen in a vacuum-tube, in an effort to determine what caused a strange green light in the aurora borealis. When the auroral light is passed through the prisms of a spectroscope, a green line appears. For a long time, the origin of this line was uncertain, but a few years ago a French scientist, Professor Vegard, claimed that it resulted from solid nitrogen when bombarded with cathode rays from the sun. Professor McLennan, however, announced at the Toronto meeting of the British Association for the Advancement of Science in 1924, that he had found the luminescence of solid nitrogen of different color from that of the green aurora line.

In the new experiments made with the Coolidge cathode ray tube, the experimenters find that there is not only the green luminescence while the solid nitrogen is bombarded by cathode rays, but that following the turning off of the tube, there is a greenish red phosphorescence that continues for a time. This, they believe, is due to the solid nitrogen changing from one molecular form to another, the second form being the one that continues to glow. The red glow, however, is not of the same wave-length as one that Professor Vegard claimed to have discovered.

OPTICAL GLASS

SOMETIME, about next February, scientists at the Bureau of Standards will know whether or not they have the largest disc of optical glass ever cast in the United States.

During the war, when European sources were closed, the bureau began to make optical glass. Last May these experiments reached a climax with the casting of a disc of glass 70 inches in diameter and 12½ inches thick. This is the largest disc that has ever been cast in the United States, and one of the largest in the world.

But such a disc is not finished when it is cast. Glass conducts heat very poorly. It is very hot when cast, for then it is in a molten condition. If simply exposed to the air as soon as it begins to harden, the outside would cool much more quickly than the interior. In doing so it would shrink, and the result would be that the disc would soon be merely a pile of small pieces of broken glass. Even if cooled more slowly, strains might be set up in the disc that would cause it to crack as soon as efforts were made to grind it into the dish shape of a reflecting telescope mirror.

Accordingly, it is necessary to extend the cooling over a period of many months. In making such a big disc, it is carefully enclosed in sand and fire clay so that it takes nearly a year to cool. This is called annealing. By February, 1928, the 70-inch disc at the bureau will have cooled sufficiently for the scientists to uncover it. Then they will know whether they have a disc or some pieces of broken glass.

Annealing is not always successful. The largest disc that has ever been cast, from which the 100-inch mirror of the big reflecting telescope at the Mt. Wilson Observatory was made, was completed only after a number of attempts. This was made at St. Gobain, France, where, before the war, the principal factory for large discs was located. Time after time discs were cast, only to find months later that they had cracked in annealing. Even the one finally used was not perfect, as it was cast in three layers, and when completed showed two layers

of bubbles, like the filling in a layer cake. So it may be that the American optical glass workers will find in a few months that they have to try again.

Even if the disc comes out of the annealing safely, it is not known what will be done with it. The St. Gobain works were demolished, and many of their most skilled workers killed in the war, so that large discs are very hard to obtain. Several American observatories are in the market for big discs for reflecting telescopes, but just how the bureau's disc could be transferred to one of them is not certain. There are legal difficulties hampering the sale or gift of the glass, and so it might take an act of congress to dispose of it. But the bureau officials are not worrying about this bridge at present. What they are chiefly interested in is whether or not they have the disc.

CARBON MONOXID POISONING

WITH the return of cold weather the specter of carbon monoxid poisoning again haunts automobile drivers. Unless humanity has had a sudden access of caution, we may expect occasional news items about unlucky persons, warming up their motors in closed garages, being overcome and killed by this insidious, odorless, invisible gas.

Carbon monoxid is a product of imperfect combustion. When a fuel is burned under ideal conditions it is not produced. The only products of perfect combustion are carbon dioxid and water. But ideal combustion conditions are almost never realized, certainly not in even the best of automobile engines. The average of analyses of exhaust gases from 101 different makes of cars by the U. S. Bureau of Mines showed 7 per cent. of carbon monoxid.

In one experiment a dog was left in the driver's seat of a car in a tightly closed garage, with the engine running slowly. In 20 minutes the dog was found unconscious. The air in the garage was analyzed and found to contain 1½ per cent. of carbon monoxid. Had a man been in the dog's place the results would probably have been the same.

Because it has neither color nor odor, carbon monoxid frequently overcomes its victims with no warning whatever. The first symptom is a severe pain in the back of the head; but if the concentration of the gas is too high, the victim may lose consciousness before he can act on this warning. Small doses may have no other effect than to cause severe headache, but a heavy "gassing" is an exceedingly serious matter, and convalescents from carbon monoxid poisoning should be kept in bed even when they protest that they are "all right."

To avoid carbon monoxid poisoning, it needs no more than good ventilation in the garage, even at the expense of a cold motor, to make the place perfectly safe. Carbon monoxid is slightly lighter than air, and vanishes almost immediately through an open door or window.

Persons overcome by the gas should be given first aid by artificial respiration, and a doctor should be called immediately. In places where such accidents are at all likely to happen, the standard apparatus for administering oxygen, with the addition of 5 per cent. of carbon dioxid, should be kept in constant readiness.

Automobile engines are by no means the only sources of carbon monoxid poisoning. The fuel gas of most of our cities consists of a mixture of "water gas," which is made of hydrogen and carbon monoxid, with either natural gas or gas from evaporated oil. The carbon monoxid content of such fuel gas may run as high as 30 per cent.—over four times the concentration of the average automobile exhaust. Faulty gas connections, broken rubber tubing and other difficulties with the domestic gas supply have been blamed for ten times as many carbon monoxid casualties as are caused by automobiles.

Carbon monoxid would be a prime factor in modern warfare if it were not so easily dispelled in the open air. The high explosives with which shells are loaded generate great quantities of it; the gas from a TNT explosion contains as much as 60 per cent. of carbon monoxid. If a shell happens to explode in a dugout or other confined space, the soldiers who escape injury from the fragments and the concussion are very likely to fall victims to the gas. It is the more deadly since even the most modern types of gas mask afford far less protection against it than they do against the heavier varieties of military poison gas.

THE SUMMER OF 1927

THE past summer was cooler than usual in the eastern states, but hardly enough to justify the predictions of a summerless year, according to Professor Alfred J. Henry, of the U. S. Weather Bureau. Professor Henry has just announced the results of a study of abnormal summers. He finds that at New Haven, Conn., and at New Bedford, Mass., where the records extend back for a century, the past summer ranks No. 30 and 32 in coolness. At both these places the famous "year without a summer" of 1816 was the coolest, but at New Haven there have been 29 summers since that have been cooler than the past one, while at New Bedford there have been 31. In the western states, however, the summer was unusually warm. At Portland, Oregon, only the summer of 1926 was warmer than that of 1927, according to records which extend back for half a century. At San Francisco, 1927 ranks third as a warm summer, only 1888 and 1925 having been hotter.

In the middle west and east, only the records of Lynchburg, Virginia; Memphis, Tenn., and Cincinnati, Ohio, show 1927 to have had the coldest summer in fifty years. At New York, Philadelphia, Chicago, St. Louis and Indianapolis the last summer was the second coolest, while at Washington it was third coolest.

"In the last fifty-odd years," says Professor Henry, "four summers of exceptional coolness, 1903, 1907, 1915 and 1927, have occurred. Comparing these summers one finds that there is little to choose from as to which was the most conspicuous as to the depression of temperature. Considering the length of time the low temperature prevailed and the area affected and the minimum tempera-

ture recorded, 1915 should be given first place. Each month of that summer, including May and in a less degree September, was abnormally cold.

"The greatest depression of the temperature in the summer of 1907 was in June following an exceptionally cool April and May. The cool summer of that year may, therefore, be considered as a hold-over effect from the cold spring immediately preceding.

"The remaining three summers, 1903, 1915 and 1927, have several features in common, the most striking being the fact that each of them was preceded either in May or June by flood-producing rains in the lower Missouri Valley and adjacent territory. It may also be pointed out that the interval between these cool summers is exactly twelve years. If we go back another twelve years to 1891 we find that the mean July temperature of that year was the lowest on record up to that time in a large part of the country. The flood-producing rains were, however, absent to a great extent. Whether the heavy rains are the primary cause of the cool summers or whether both events are due to a common cause, is, of course, unknown."

In Alaska and Canada, Professor Henry points out, a period of warm weather began at the same time as the cool weather in the United States.

Professor Henry also suggests that the coolness of 1816 may have been exaggerated. During that year, he says, "there is not the slightest justification for assuming that the summer temperatures generally throughout the United States were unduly low."

THE MIGRATION OF STORKS

YOUNG storks find their way to the winter stamping grounds of their race whether they have a leader to show them the way or not, German scientists have found.

Studies with the birds that show that the migratory instinct manifests itself in storks regardless of outside influences have recently been reported to the American Ornithologists' Union by Dr. Theodor G. Ahrens, an American ornithologist living in Berlin.

Young storks with wings partially clamped down to prevent flying and fitted with identification bands, were kept in a marsh near Rossitten, East Prussia, by Professor A. Thienemann, of the Christian Albrechts University of Kiel. When the migrating season approached the birds were kept in cages until all the storks in Germany had flown south. Then they were carried back to the marsh and released. Reports of their band numbers, received from ornithologists in various parts of East Prussia who had picked them up, showed that they had followed more or less the customary route south without the guidance of leaders.

By December one of the birds was shot at Keratea, not far from Athens. The Greek police had some difficulty, Dr. Ahrens reported, in inducing the hunter to give up the bird's leg band because he wanted to keep it as a talisman. Some twenty other storks were seen in the same region at the same time. This report indicates that the leaderless storks while keeping to the south had veered to the west instead of taking the usual route to Africa by way of Asia Minor and Palestine. In spite of having been forcibly detained beyond the customary time for migration when the chance came, Dr. Ahrens pointed out, the birds knew what to do and did it.

Professor Thienemann repeated the experiment on a larger scale during the fall of this year, but returns have not yet been received to indicate the route by which the second lot of storks eventually found their way south. The large quantity of food that storks require, estimated by Professor Thienemann as over a pound of fish, frogs and insects per day, is thought to be one reason for the decrease in the numbers of these birds. Drainage of marshes and the growth of cities makes it more and more difficult for them to get food. The systematic use of poison to kill off insects in South Africa has also resulted in the death of many more storks who eat the poisoned insects for food while sojourning in their southern range.

ITEMS

INOCULATION of shade trees against a deadly bacterial disease, with an immune sap analogous in many ways to the immune sera used in medical and veterinary treatments, is being practiced by a German landscape architect, Walter Ilisch. Shortly after the war, a very destructive ailment of shade trees, especially troublesome to elms, began to be distressingly noticeable in German cities. It was traced to an original site in Holland, whence it has spread through the low countries, northern France and all of Germany. It was first ascribed to the polluted air of industrial cities, as well as a number of other causes, but finally proved to be due to a small round bacterium, known technically as a micrococcus, which invaded the water-conducting tubes in the sapwood and choked them. Herr Ilisch developed his immune sap treatment, which he injects into the trees by a very simple process. He bores holes in the trunk, drives into them long-bowled wooden pipes, such as old-time Germans like to smoke, and fills up the bowl with his preparation. The fluid enters the sapwood and distributes itself through the afflicted tubes. Die Umschau, a German scientific publication, vouches for the success of the treatment.

THE mummy of a prehistoric Indian, almost entire, has been unearthed in the Petrified Forest National Monument, in Colorado, and placed in the museum there. The find was made by William Cox Buehler, custodian of the reservation, who states that the slightly undershot jaw places the Indian in the class of "oldest inhabitants." Evidently the aborigine was a prominent member of his tribe, judging from the carefully prepared grave, which was lined with sandstone slabs and was in a good state of preservation when found. The skeleton had charcoal under and over it, even in its ribs and eyesockets. Its skull was in good shape, the teeth in especially fine condition. Other articles of archeological interest brought to light in uncovering the skeleton were two whole bowls, a stone hammer, two grinding bowls and some grinding stones. These also were placed in the museum.