SCIENCE NEWS

ISOLATION OF A VITAMIN

Science Service

ONE of the elusive vitamins has at last been isolated. Drs. Walter H. Eddy, R. R. Williams and Ralph W. Kerr, working in the laboratories of Teachers College, Columbia Uniersity, have obtained from brewers yeast a crystalline substance, containing the elements carbon, hydrogen, nitrogen and probably oxygen, that has all the properties of vitamin D or "bios," as it is sometimes called.

This vitamin has the property of stimulating the growth of yeast. That yeast contained such a stimulant was announced in 1900, but it has never before been obtained in a chemically pure state.

Although it does not influence animal growth in the way in which vitamins A, B and C do, Dr. Eddy states that

"A special interest attaches to this isolation from our viewpoint in that the method successful with bios may be extended to the study of other vitamins. It will permit physiological studies of how a growth stimulus acts on living matter without the handicap of contaminating factors. We hasten to add with a view to discouragement of the patent medicine field, that there is at present no indication that better growth effects can be obtained with the purified material than with food extracts or foodstuffs holding it in combination."

The properties of the newly isolated substance are given as follows: "It is crystalline and the crystals melt sharply at 223 degrees Centigrade. The crystals act on polarized light and their index of refraction lies between 1.52 and 1.53. When this crystalline material is added to a yeast culture medium amounts as small as 0.005 milligrams per cubic centimeter of medium produce an increase of yeast growth of about twenty times the control in twenty-four hour incubation. It is too early as yet to construct the formulae, but we are sure that the carbon per cent. is 43, the hydrogen 8, and that the nitrogen content will run about 25 per cent. The yield by our method is about 70 milligrams from six pounds of moist brewers yeast. The process of separation has been repeated several times and with identical results. It is also found that there is a direct correlation between the activity of yeast extract residue and the amount of crystalline product removed. These results seem to indicate both that the product we have isolated is a chemical entity and that the activity of yeast growth extracts are due to this entity."

Dr. Eddy is professor of physiological chemistry in Teachers College, Columbia University. Dr. R. R. Williams is in charge of the chemical laboratories of the Western Electric Company and was in the Philippines when vitamin B was first discovered. Dr. Ralph W. Kerr is a recent graduate of Columbia.

Bios was first described by a French scientist, Wildier, in 1900. To similar substances shown to be present in various plant extracts Bottomley later gave the name of auximones. Neither of these authors actually isolated the substance, but they did show that the extracts contained something which stimulated the growth of yeast cells and other organisms.

Interest in the subject was revived in 1916 by Roger Williams who suggested that bios was actually vitamin B. It was finally discovered that while most substances rich in vitamin B do stimulate yeast growth, the stimulation may be due not to the presence of vitamin B, but to some other factor accidentally associated with it. In 1922 Casimir Funk was able to show that when an extract rich in B was shaken with Fuller's earth, the earth would remove the power of the extract to cure beri-beri, a property exclusively related to B, but did not remove the yeast growth stimulation factor. Funk interpreted his results to indicate that such extracts contained two vitamins, one the antineuritic factor for which he proposed to retain the name B and the yeast growth factor which he called vitamin D.

This suggestion of Funk's originated a controversy in which various investigators have taken part. They attempted to show that the yeast growth factor, while highly stimulatory to yeast growth, is not essential to its growth. They would reserve the term vitamin to substances producing growth, but limit it to such as were absolutely essential to growth. Others believe the term vitamin should be restricted to such factors as are essential to mammalian nutrition. Thus the yeast growth factor has been described under the two names, bios and vitamin D.

PROTECTION OF THE CORN BELT

Science Service

THE United States Corn Belt, the world's greatest food-producing area, is threatened by the advance of a European insect army. To meet the menace of the invading corn borers at the frontier, eighty entomologists, agronomists and country farm agents from Illinois, Indiana, Ohio and the federal government will in April officer a great offensive along a wide front in northern Ohio, according to war plans outlined recently by Professor George A. Dean, of the U. S. Bureau of Entomology.

An expert will be placed in every township of the infested area and some 20,000 farms will be visited to show farmers how to check the spread of the insects by destruction of the remnants of last year's crop. Later in the season some 50,000 insect allies drafted from among the foes of the corn-borer in its native land will help also to be used in the fight.

The European corn-borer entered America very probably in broom corn shipped from Italy or Hungary. It was discovered attacking sweet corn near Boston in 1917, and since then it has been a limiting factor in the growing of sweet corn in eastern Massachusetts. Another extensive area was occupied around Schenectady, New York. The insects also gained a foothold in a wide section north of Lake Erie in Ontario, Canada. Later the territory along the American shore of the lake in New York, Ohio

and southeastern Michigan became infested. Last year a marked spread of corn borers was noted in northwestern Ohio which is the beginning of the great corn belt of America.

The strategic importance of this infestation in respect to the corn belt aroused other corn-raising states. Illinois, two hundred miles from the present front, is sending experts to Ohio to cooperate in the work, as is the yet uninvaded state of Indiana. Canadian authorities are also working with the Americans to control this dangerous enemy.

In the fall, the corn-borer, in the form of a brownish caterpillar or worm about an inch long, which has been tunneling into the plant, hibernates for the winter.

As soon as warm weather begins in April or May, the borer becomes active again and about the middle of May it cuts a small circular opening from its tunnel to the surface of the plant in order to provide an exit for the future moth. It then closes this hole with a thin partition of silk and goes back into its dugout gallery where it spins a thin cocoon. About the first week of June, the borer emerges as a moth which can cover as much as 400 yards in a non-stop flight and travel anywhere from five to ten miles. The female moth usually lays her nearly flat little eggs in clusters on the under side of a leaf. The young borer, hatched from these eggs, eats for a while on the leaves, and then starts digging itself into cornstalks, corncobs, weeds or other plants, where it completes most of its development, incidentally injuring the plant.

The corn-borer attacks all parts of the plant and while it prefers corn and sorghum there are some 200 species of plants which it is known to attack. The most successful method of getting rid of this pest has been found to be the destruction of the remnants of the crop in which the borer hibernates.

Entomologists at the United States laboratory at Hyeres, near Marseilles, France, have discovered a parasite known as *Exeristes roborator,* which may prove an effective ally in checking the further spread of the borers by preying on their young which it is able to locate through corn stalks or even burdock stalks. Fifty thousand of these insect foes of the corn-borer will be released this summer in the infested areas of Ohio and New York.

BEARDLESS BARLEYS

Science Service

NAKED barley, whose peculiar virtue is that it is easily threshed, is one of the desirable agricultural immigrants brought back by Dr. Harry V. Harlan, plant explorer of the U. S. Department of Agriculture, who has just returned from a year's journey to India, Abyssinia and Egypt. He was unsuccessful in finding any new varieties of bald or beardless barleys, but brought back a general assortment of foreign varieties of small grains and legumes.

While unwhiskered barleys are known in this country, having been introduced from India many years ago, they are not of the most suitable varieties, and Dr. Harlan hoped to find some of the variants of the species which would serve for breeding crosses. These were said to be found in Nepal in India, but Dr. Harlan learned that travel to that rather remote region was so slow and uncertain that if he tried to make the trip he would be in danger of missing the trip to Abyssinia on the way home. But while in India he found some very early varieties of barley, as well as early wheat and legumes, seeds of which he brought along.

The "naked" barley, or barley which is easily separated from the glumes which enwrap the grain, and is therefore easily threshed, was found in Abyssinia and Egypt. Varieties of emmer, also easily threshed, were found. Emmer is a small grain used in Abyssinia for both forage and bread, but in most varieties the difficulty in threshing it makes it unsuitable for bread making. It is grown to a slight extent in this country. Interesting varieties of field peas, thought to be new to this country, were also found.

The natives of Abyssinia subsist chiefly on meat and bread. Asked where they got the vitamins which other races secure from dairy products, fruits and fresh vegetables, Dr. Harlan said that they used milk to some extent, but as a rule ate their meat raw, in many cases devouring the slain animals while they were still warm, possibly by this means getting the vitamins from the fresh meat. This diet, while simplifying domestic economy, makes the Abyssinians subject to tape-worm. They use honey for sweetening and make a powerful drink from it.

Dr. Harlan was in the Punjab in India during the hot season last summer and said that for a long period the temperature never fell below 100 degrees, day or night.

THE PURIFICATION OF HELIUM

Science Service

THE first helium purification car for use by the U. S. Army Air Service has been completed under the direction of the U. S. Bureau of Mines and will soon be delivered to the Air Service. It is intended for use throughout the country where helium filled balloons need to have their helium purified and separated from impurities, such as air, which diminish its lifting power.

Helium not only diffuses out of balloons, but the air diffuses in. This affects the buoyancy of the gas to such an extent that a balloon filled with a mixture of 85 per cent. helium and 15 per cent. air is practically useless. The problem has been to get the air out without the necessity of taking the balloon to one of the large stationary purification plants.

This problem the Bureau of Mines has solved through use of the property of charcoal when kept at a low temperature to absorb practically all gases, the only exceptions being inert gases such as helium. A device for the refrigeration of helium is mounted on railway trucks and arranged so that it may be transported to the immediate neighborhood of all principal landing fields and airdromes.

When a balloon descends with the helium in it mixed with air, the car will be sent for and will take the gas

from the balloon, purify it and compress it in metal cylinders from which it may be returned to the balloon.

The importance of the device is that it is the first successful attempt to use the absorbing property of charcoal for the purification of helium on a commercial scale. It gives helium of a high degree of purity and has a capacity of 800 to 1,000 cubic feet of gas an hour.

THE SPECTRUM IN INDUSTRY

Science Service

AMERICAN industry is making use of the spectrum as a detective, operating for its protection, it is revealed by the Bureau of Standards. Increasing numbers of industries engaged in the manufacture of metal products are finding a valuable aid in the method of spectral analysis of metals which they use, and which has been developed to its present state by the spectroscopy section of the Bureau of Standards. According to W. F. Meggers, head of this section, this system offers a more convenient and rapid means of detecting impurities in metals than chemical methods. Two big New England firms, one engaged in brass and bronze manufactures and the other in silver, are making constant use of a spectrograph, a device which makes this detection of various chemical elements a simple procedure. Other firms in Cincinnati, O., and Buffalo, N. Y., are using the same development.

Scientists of another generation, who had knowledge of the spectra of various elements, found themselves handicapped in applying a method. Except for a small group, they left the development of spectroscopy to physicists and astronomers. Through their findings in this field, the latter were able to discover helium. Increasing knowledge in the fields of electricity and photography, however, was brought to the aid of the scientists who clung to their belief that spectral analysis of materials could be perfected. And the patient persistence of this group has been rewarded.

It was while the Bureau of Standards was engaged in researches in this science that a problem came up. A steamship had been lost by a boiler explosion. In such boilers there had been placed a safety plug which was supposed to melt at certain temperatures forming one of the conditions preceding such an explosive point. The "safety plug" had apparently failed. "Why" the bureau was asked.

The spectrograph revealed that plugs which were supposed to be of pure tin contained a trace of lead, zinc and other metals in some cases. Pure tin melts at a temperature of 232 degrees, Centigrade. The presence of lead or zinc or other impurities caused the formation of a compound which required a very high temperature for melting. The reason was clear. Hence the spectrum analysis had been applied in a rapid and convenient manner, and an optical method could supplant a more complicated chemical test. The bureau then developed specifications and methods of test to eliminate further accidents from this source. In the case of a mid-western manufacturer whose factory made high pressure valves, leaks were discovered. Again the Bureau of Standards was asked "Why?". Mr. Meggars and his assistants took some of the material used and the spectrograph revealed the presence of aluminum in the alloy—in a degree unfavorable to high pressure work.

Not long ago the spectrographic method revealed its accuracy in "checking up" the Bureau of Standards itself. Standard samples of vanadium steel had been prepared and sent to various points. Word began to come back that these "standards" showed traces of tin. At once an exhaustive check-up was begun. The operations were carried on to the point of boiling down some of the chemical reagents used in preparation of the samples. A tiny scrap of residue was found, not larger than the head of a pin, too small for chemical analysis. Use of the spectrograph disclosed that there were eleven chemical elements in this tiny speck, and that the most prominent was tin.

In preparing purity standards of platinum, rhodium, iridium and palladium, the spectrograph has again been used with success, and it is declared that the chemical knowledge of these unusual metals is as yet so unsatisfactory that this method is the only safeguard.

ITEMS

OVER 50,000 fewer people died in the United States during the first nine weeks this year than last year, if figures gathered by the Bureau of the Census from cities and announced by Surgeon General Hugh S. Cumming, of the U. S. Public Health Service, indicate a nation-wide condition. The unusually low mortality rate from December 30 to March 1 is only 13.8 per thousand population per year, contrasted with nearly 16.5 per thousand for the same period last year.

THIS year has made the healthiest start on record, statistics of the Metropolitan Life Insurance Company, just announced by Dr. Louis I. Dublin, indicate. January lowered the first month record of last year and February did still better. Tuberculosis mortality dropped 13 per cent., heart disease, 22 per cent., apoplexy, 11 per cent., and Bright's disease, 14 per cent. from the February 1923 rates. Influenza killed only about one fourth as many as last year. Diabetes this January took only 17.2 per 100,000 as compared with 20.3 for January of last year and an even more pronounced decline was recorded for February.

PHOSPHORUS bombs and grenades used in practice by the army at the proving grounds at Aberdeen, Md., caused heavy mortality in an unexpected source. After the tests, large numbers of dead ducks were found in the neighboring waters of Chesapeake Bay. Examination showed that the ducks had eaten fragments of unconsumed phosphorus which had fallen in the water of their feeding grounds. Now they are using devices to frighten the birds away before the tests are made, and the bombs are being exploded either over the land or over water so deep that the ducks do not feed in it. Casualties so far are estimated at 500 and it is feared they may be much greater before all the poison is dissipated.