SCIENCE NEWS

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THE SUPPLY OF VITAMINS AND HORMONES

THAT there should be no shortage of vitamin A during the present emergency was stated by Kenneth Hickman and Graham C. Mees, of Distillation Products, Inc., at a national defense session at the St. Louis meeting of the American Chemical Society.

Vitamin A is needed for normal growth in children and for good health by people of all ages. It is found in cod and other fish liver oils, and butter and the yellow vegetables such as carrots are good food sources. "The total quantity available in the United States is more than sufficient for all purposes but certain sources are too weak for direct application or for profitable concentration. Most of the vitamin A in the weaker sources, such as palm oil and fish body oils (sardine, menhaden, salmon, etc.) is destroyed because these oils are used industrially without the vitamin being extracted. In the present national emergency, which may be intensified by shipping vitamin products abroad, these weaker sources can be utilized."

Flavor, price and lack of machinery for concentration were mentioned as possible limitations to obtaining vitamin A from these weaker sources. Expansion is now under way in machinery for one process, high vacuum distillation, which will enable the vitamin to be extracted from the weaker oils before the residue is put to industrial uses.

Commercial preparation and clinical use of certain highly important chemicals produced in the cortex or rind of the tiny adrenal glands of the body need improvement as a national defense measure, it appears from a report by Dr. E. C. Kendall, of the Mayo Clinic.

One of these chemicals in particular, known as compound E, has a "remarkable influence on the resistance to shock and toxic substances," Dr. Kendall pointed out. It also has an effect on the capacity of muscle for work.

Any use it might have in treating shock due to war wounds, however, or for other medical purposes is limited by the fact that the total annual supply of this and another important adrenal gland chemical in the United States, derived from animal glands, could not be greater than about one pound.

The other chemical is called compound F for short. These two should not be confused with vitamins bearing the same letters for names. Both these adrenal gland chemicals have "a striking effect upon the enzymes involved in the conversion of proteins to glucose."

The effects achieved by compounds E and F are not achieved by another chemical from the adrenal gland cortex, desoxycorticosterone acetate, which has been used in recent years to keep alive patients suffering from Addison's disease, the once-fatal ailment characterized by a strange bronze discoloration of the skin.

To make these other compounds available for the many uses they may have in war and peace time medicine, chemists must produce them synthetically. Dr. Kendall said synthetic production is the only possible solution to the problem of the shortage of compound E.

CHEMICAL TESTS FOR VITAMINS

AT the American Chemical Society meeting in St. Louis, Dr. E. M. Nelson, of the U. S. Food and Drug Administration, made an appeal to chemists for help in national defense on the nutrition front by developing accurate chemical tests for vitamins. Later, two such tests were announced.

One is for determining the amount of nicotinic acid, the anti-pellagra vitamin which is being put into the new enriched bread and flour. This test was developed by Dr. Bernard L. Oser, Daniel Melnick and Louis Siegel, of the Food Research Laboratories, Inc., Long Island City, N. Y. It is said to measure accurately the nicotinic acid content of both natural and fortified breads and flours.

The other test is for the combined determination of the amounts of the thiamin or vitamin B_1, and riboflavin. Thiamin is a "must" ingredient for the new enriched breads and flours and riboflavin is an optional ingredient. The new method for determining the amounts of these two ingredients in wheat and corn was developed by R. T. Conner and G. Straub, of the General Foods Central Research Laboratories, Hoboken, N. J.

Tests for vitamins heretofore have been made by feeding the test materials to animals and observing their reactions to the diet. Such feeding tests were time-consuming and in other ways less satisfactory than chemical tests. Tests for the amounts of vitamins in foods such as the new enriched bread and flour are needed because even though the correct amounts are added to the flour or the dough, some might be destroyed or otherwise lost by the time the flour was made into dough and the dough baked into bread. Both baking and milling industries and law enforcement officials need quick chemical tests for detecting any losses of this type that might occur.

The combined test for vitamin and riboflavin in wheat and corn show that variety, locality, soil and environmental conditions during growth have a marked effect on the vitamin content of these grains.

A NEW TYPE OF FLOUR

PEELING the indigestible, corky outer coat off wheat grains by means of the flotation process, invented primarily for use in processing metal ores, is the newest development in the bread revolution now actively going on in the milling and baking industries.

The new process is the discovery of a Los Angeles mining engineer, Theodore Earle, who is in Washington at present. By removing only the corky epidermis, it is claimed, the grain can be left in condition to produce a high-vitamin, high-mineral, high-protein flour without sacrificing the smooth texture and agreeable color which most people find attractive in white flour. The new flour is not snow-white, but has what its enthusiasts describe as a "rich, golden tint." Furthermore, they declare,

it is not necessary to put back into it the minerals and vitamins that are now being added to white flour by the new "enriching" processes coming into practice in the milling and baking industry. The natural minerals and vitamins are simply left in to begin with.

The part of the wheat grain removed in the Earle process is its outermost covering layer, or epidermis. This layer, only a few cells thick, is tough, flavorless, and completely indigestible. Millers nickname this part of the grain "bee wings." Beneath it are several other layers, composing the remainder of the bran coat, including the innermost, protein-rich layer known as the aleurone layer. It is the removal of this layer in the ordinary bolting process that has raised most of the objections to present-day white flour. The Earle process removes the worthless epidermis and leaves the valuable parts of the bran still clinging to the starch-and-glutin mass that makes up most of the wheat grain.

Mr. Earle discovered the basis of his new process quite by accident. His hobby is gardening, especially raising choice shrubs and other plants from seed. He also distributes seed to garden-loving friends. Once, when he was trying a modification of the familiar flotation process to separate good seeds from worthless ones, he was interrupted by a long telephone call. When he returned to his flotation apparatus he found that his seeds had been peeled. He then tried the flotation process on wheat. In the flotation process as applied to mining, finely ground ores are dumped into water containing a small quantity of pine oil or other chemical, which is whipped up into a sudsy foam. This foam contains the valuable bits of metal; the dross settles to the bottom and is discarded. As applied to wheat, the flotation process floats the flakes of worthless epidermis to the surface in the foam and permits the sound wheat grains to sink. To speed up the process, the grains are thrown about violently in rubber-lined containers before they are put into the flotation cells. This just cracks the tough outer layer but does not break the grains themselves. As it comes from the flotation cells the grain is thoroughly wet, and must of course be dried before it can be milled into flour. Since no present milling procedure deals with wet grain at all, it was necessary to adapt a pea drier when large-scale experiments in milling were begun.

The Continental Baking Company has become interested in Mr. Earle's invention. This firm has refitted a shut-down flour mill in Kansas City for the production of flour by the new process, and now has a production capacity of a thousand barrels a day.

It is claimed on behalf of the new flour that it will keep well—one lot remained on hand nine months without spoiling, according to Mr. Earle. He also states that the new flour can be marketed at no advance in price over the standard kinds now available.—FRANK THONE.

A THERMAL DIFFUSION SEPARATOR

A TOWERING instrument 14 feet high, in the General Electric Research Laboratory, at Schenectady, N.Y., may prove the forerunner of the equipment with which science will one day separate power-producing atoms in sizable quantities.

The device is a "thermal diffusion apparatus." It is used in the separation of isotopes, which are forms of the same chemical element of different atomic weight. It was once thought that all atoms of the gas chlorine, for instance, weighed the same—about thirty-five and a half times that of the hydrogen atom.

During the past quarter of a century researches have shown that chlorine, like most elements, really consists of atoms of different weights. About three quarters of the ordinary chlorine atoms are of weight 35, one quarter of weight 37, while there are a very few of weight 39.

At the University of Munich, K. Clusius and G. Dickel a few years ago devised the thermal diffusion method, which has proved to be one of the most efficient methods for separating the different forms, or "isotopes," of the elements. With it, they have separated not only the isotopes of chlorine, but those of neon, krypton and others.

Potentially of great importance is the fact that the same method may be used to separate the 235 isotope from the heavy element uranium. This isotope is the one that may prove capable of yielding practicable atomic power, as it is estimated that a pound of U-235 would provide several million times as much energy as a pound of coal. More than a year ago, investigators in the General Electric Laboratories, as well as at the University of Minnesota, succeeded in securing exceedingly minute amounts of the isotope by another method, but not enough to test its power-producing capabilities.

The thermal diffusion separator at Schenectady consists of two glass tubes, 14 feet long, one inside the other, and a gold wire extending from top to bottom in the inner tube. It contains, in gaseous form, the material to be separated, which is kept at a fixed temperature by passing steam through the outer tube. When the gold wire is heated, the lighter atoms go to the top and the heavier atoms to the bottom where they are collected. A gold wire is used because a baser metal might be consumed or attacked by the material being studied.

For separating uranium isotopes, a material other than glass would have to be used, since the only gaseous compound of uranium is uranium hexafluoride. Because of the fluorine in it, this gas attacks glass. If the tubes also were made of gold, they would not be affected.

A GLARE-ELIMINATING SCREEN FOR AUTOMOBILES

A NEW type of glare-eliminating screen for automobiles and other purposes, claimed to be 99.99 per cent. efficient, has just been patented by Edwin H. Land, president of the Polaroid Corporation. It is the first to use invisible, submicroscopic molecules instead of crystals to line up light waves so that they all vibrate in the same direction, and can be partly or wholly cut off by another sheet of the same material set at an angle to the first. It is also the first to be made of wholly synthetic materials, all obtainable in the United States.

Previous polarizers, used in sun glasses, lamps, etc., have employed minute crystals (usually of quinine) embedded in a plastic sheet. The new one, known as Type H,

uses one of the new synthetic, rubber-like plastics known as polyvinyl alcohol. This is stretched out from three to eight times its original length, which gets its molecules all parallel with each other; then it is exposed to an iodine solution, which enables the molecules to filter the light into all-one-way (polarized) waves.

Use of polarizing sheets as headlight glare eliminators has been contemplated for a considerable time. If the headlights are screened at an angle of 45 degrees so that they will send out only polarized light waves, and if the driver uses a similar screen on his windshield, the blinding glare of oncoming headlights is eliminated. The new kind of Polaroid promises to bring headlights and eye-screens of this kind closer to realization.

The new Type H Polaroid is said to transmit a third more light than earlier types of polarizing sheets, and yet when two sheets are turned at right angles to each other practically no light at all gets through. In tests with the sheets turned completely at right angles, a hundred-watt lamp behind them became completely invisible.

Almost perfect freedom from color, together with high efficiency and polarizing power, are expected to make the new sheeting especially suitable for scientific and military optical instruments, camera filters for color photography, projection of three-dimensional pictures without color distortion, glareless illumination for stores, desks and art galleries, and for other purposes. The materials used in the wholly synthetic polarizing sheeting are coke, lime, air, water and iodine.

In another invention patented at the same time, Mr. Land offers a curtainless window which can transmit more or less light at the user's will, simply by stretching a sheet of the new synthetic sheeting between two panes of glass. The inner surfaces of the panes are coated with thin films of the polarizing substances, with axes at angles to each other. The intervening elastic sheet, with axis at a third angle, cuts off most light when it is not stretched tight. The tighter it is stretched, the more light is permitted to pass.

ITEMS

HARRY BERMAN, curator of the Harvard Mineralogical Museum, has used the cyclotron, in a new rôle, to make green diamonds. The technique is simple: put an ordinary white diamond in the cyclotron and bombard it with high-speed atomic particles for an hour and it becomes a gorgeous dark green gem. Studies show such cyclotron-treated diamonds to be virtually identical with naturally occurring green diamonds which are given their tint by long-term exposure to radioactive substances. The cyclotron bombardment, because it is considerably more intensive than that from radioactive substances, simply acts to speed up the process.

BRACKEN, a tall, tough fern that is a rank and troublesome weed in Scotland, may help to solve Britain's wartime paper shortage and thereby defray the cost of its removal. Bracken is a common and wide-spread plant in the United States, but has never entered the nuisance class in this country. In Scotland it takes possession of whole fields and pastures. Not even goats will eat it, and it seems to have no natural enemies. The only way to control it is to mow it several times a year, but this is impractically costly unless some use can be found for it after cutting. Hence the paper-making experiments. In some parts of the Orient the young fronds are used as an asparagus-like vegetable dish. However, white men did not find it palatable when they tried it; even a 24-hour soaking in salt water before cooking failed to remove its objectionable bitterness.

SELECTED strains of inbred sweet corn from England, parents of some of the better hybrid varieties, according to Dr. W. R. Singleton, of the Connecticut Agricultural Experiment Station, will be sent to the United States. Dr. Singleton has been in correspondence with a leading English plant breeder, C. D. R. Dawson, of London, and has asked him to send small quantities of his inbred seed corn, so that the strains may be kept going until after the war. Sweet corn is a luxury crop in England, and there will be neither land nor time to spare for it this spring. Mr. Dawson has tried out American sweet corn hybrids which he has received from Dr. Singleton, and pronounces them quite good, under English conditions. He has also developed a successful English-American hybrid sweet corn, of which he has sent seed to Dr. Singleton.

FISHING on the lower Tennessee Valley Authority reservoirs is similar to that found on several northern lakes, was reported by Clarence M. Tarzwell and Lawrence F. Miller, fish specialists, Tennessee Valley Authority, before the meeting of the American Society of Ichthyologists and Herpetologists. They estimated that these great artificial lakes accounted for over 1,100,000 "man days" of fishing in 1940. Careful counts were made of fishermen on the four lower reservoirs of the Tennessee Valley Authority: Guntersville, Wheeler, Wilson and Pickwick, from March to December, 1940. Such factors as day of the week, condition of weather, and fishing modes and sites were taken into account. Analysis showed that fishing was most intensive in April, May and June, after which it declined to the season's low in December. At first there was a weekly cycle, but later bad weather was the main thing that kept the fishermen at home. Most fishing went on just above and below the dams, and near centers of population; least fishing was observed in the upper reaches of the reservoirs and on the wide waters above the dams.

DIVE bombers, as well as planes flying horizontally, are taken care of with a new automatic fire control system devised by Earl W. Chafee, of the Sperry Gyroscope Company. It is designed to operate even from a moving ship, pitching and tossing in a rough sea. Details of the invention (U. S. Patent 2,235,826) include an intricate electrical and mechanical system, connected with the range finder and automatically moving the guns. When the plane is sighted the mechanism calculates its exact distance and direction. To devices previously invented which do this for a fixed position, Mr. Chafee has added a second converter. First is figured the plane's position relative to fixed axes, then these are converted, with the aid of a gyro-compass, to a position relative to the ship. Since the guns are on the ship, they are then properly aimed. Another part automatically figures out where the plane will be going, even if it starts diving, and keeps the guns aimed at the target.