

SCIENCE NEWS

*Science Service, Washington, D. C.*PAPERS READ BEFORE THE MINNEAPOLIS
MEETING OF THE INSTITUTE OF
FOOD TECHNOLOGISTS

E. M. CHACE, of the U. S. Department of Agriculture, speaking before the meeting of the Institute of Food Technologists at Minneapolis stated that a hundred tons of cabbage a day, with similar mountainous quantities of onions, garlic and other vegetables, are being reduced to the bulk-saving, weight-saving dehydrated form in California processing plants formerly devoted to drying fruits. When the procurement officers for American armed services and purchasers for the lend-lease program made known their huge-scale requirements for dehydrated vegetables, the first response was the conversion of the large fruit-drying plants. Some new establishments have also been set up. Mr. Chace, and also Professor S. C. Prescott, of the Massachusetts Institute of Technology, who spoke on the same program, warned against an over-enthusiastic rush to get into the food-dehydrating business. Several limiting factors impose themselves. Food dehydration is not the simplest job in the world, and the number of men with adequate technical training is relatively small. Equipment also is a problem, because a certain amount of critical metal is needed for construction of a plant, as well as cutting and other processing machinery which may be difficult to obtain. Finally, despite the gargantuan requirements of Army, Navy and Lend-Lease, their buyers are not rushing into the market to grab up dehydrated foods no matter by whom offered.

Despite their superior resistance to spoilage due to attacks of molds, bacteria and other outside organisms, dehydrated foods sometimes lose quality in storage. They become tough, or develop hay-like "off" tastes and odors. Causes for this were traced to the vegetables' own internal enzyme chemistry by Professor W. V. Cruess and Professor M. A. Joslyn, of the University of California. These enzymes are organic catalysts or ferments, necessary to the normal life activities of the plants, but damaging to their quality as foods if permitted to continue activity after harvesting and storing. In vegetables properly prepared for the dehydrator, all such life processes are stopped by steam or hot-water blanching. Several chemical tests were described and recommended for determining the amount of enzyme activity persisting in dehydrated vegetables.

The Great American Tin Can is rapidly learning how to get along on war-short rations of tin, or even to dispense with tin altogether. H. R. Lueck, director of research for the American Can Company, told of progress made in this direction. Complete tinlessness is attainable for certain types of container by a process known as "bonderizing" the steel plate. It is not a new process, having been used in the automobile industry for some years, but is only now being adapted for food containers. Bonderized cans do not have high resistance to the acids usually present in canned goods, fruits and vegetables,

but the treatment adapts the metal surface to the reception of protective plastic coating. Where tin is available, and necessary because of the nature of the can's intended contents, great economy can be effected by the relatively new electro-depositing method. Tinsplate manufacturers, Mr. Lueck said, are rapidly getting their plants into shape for using this coating technique.

Paper, cardboard, cellulose sheeting are being used as substitutes for tin. E. A. Throckmorton, of the Container Corporation of America, told of some of the ingenious ways in which manufacturers of non-metallic containers are meeting the war emergency in packaging. Greater strength and lower loss of contents are sought by bonding together materials of different kinds, forming a laminated structure. Thus, an impervious cellulose sheeting may be bonded to a strong cardboard backing, to make a package that will take hard jolts and not leak.

Indium, a rare metal which hardly anybody but chemists have ever seen, may become familiar as a shiny lining in toothpaste and shaving cream tubes, was suggested by Albin H. Warth, chemical director of Crown Cork and Seal Company. Indium is so new as a commercial metal that until as recently as 1924 only one gram (1/28 ounce) had been prepared in pure form. Since then an American corporation has been extracting it from its ore, a large deposit of which was found in Arizona. Although the metal is still very expensive, a very thin coating within a lead tube will suffice to protect the contents. Mr. Warth also pointed out that the packaging problem is not merely one of finding substitutes for tin, copper, cork and other scarce materials, but of devising packages in the making and filling of which existing machinery can be used with little modification. Otherwise quantities of steel and other critical materials will be required for new machinery. Paper, he said, has been heralded as a substitute for almost everything. But to make it moisture-proof it must be impregnated with suitable resins, themselves very scarce, resulting often in a very expensive package. The real problem is to secure coatings on metal that are resistant to sterilization temperatures. This is very difficult in view of the shortages of tung oil and synthetic resins.

A quicker way of cleaning milk cans, thereby permitting more rapid circulation of these vital food containers with corresponding reduction of the amounts of metal tied up in milk cans, was described by V. Schwarzkopf, vice-president of the Lathrop-Paulson Company, Chicago. The steam used in cleaning the cans is acidified with gluconic acid. After some experimentation it has been found possible to dispense altogether with the use of alkaline cleansing agents formerly used, thus releasing them for other essential war industries. Gluconic acid, formerly a chemical rarity costing dollars an ounce, is now a chemical commonplace costing only a few cents a pound because investigators of the Department of Agriculture some years ago discovered a strain of molds that would make it rapidly and in large quantity out of a glucose solution.

Drier and better dried beef, prepared in a few hours instead of the two to four months now required, was promised by R. C. Newton, vice-president of Swift and Company. The new product has a moisture content of only 8 per cent. to 10 per cent., making for better keeping qualities and economy in packing space and shipping weight.

An American wartime version of the "guns or butter" dilemma was presented by Ellery H. Harvey, director of research for Anheuser-Busch, Inc., of St. Louis. Nickel is needed for making tougher armor for warships and tanks. Nickel is also needed in the catalysts that tie hydrogen into vegetable oils to make creamy cooking fats and firm margarine. What is used for one purpose can not be used for the other. So chemists and physicists must find either another kind of hydrogenating catalyst containing no nickel, or devise means for making the present ones more efficient.

FUEL FOR DIESEL ENGINES

OBNOXIOUS smoke and odor in the exhaust gases of Diesel engines, now increasingly used in truck and bus service, can be reduced to insignificant proportions by use of fuels of higher cetane number and higher volatility, and selection of a fuel adapted to the engine used. (The cetane number is to a Diesel fuel what the octane number is to gasoline.)

This conclusion was reached, after testing 13 commercial fuels and 60 specially made up fuels in several different engines, by R. S. Wetmiller, engineer of the Texas Company, and Lieutenant L. E. Endsley, Jr., formerly an engineer with the Texas Company. Their findings were reported at the Peoria meeting of the Oil and Gas Power Division of the American Society of Mechanical Engineers.

The engine must be in first class condition. Improper adjustments, worn or dirty fuel injectors, or any other lack of proper maintenance can completely overshadow any benefits derived from use of a premium fuel.

However, while increase in cetane number and in the volatility of the fuel will diminish smoke and smell in the exhaust, they also decrease the power and economy of the engine. The solution must therefore be a compromise among the ends desired.

Prevention of excessive smoke and smell is especially important in view of the fact that they are worse when the engine is idling or accelerating after idling, operations that occur most frequently in our crowded city streets.

Hope was expressed that future engine design might obviate the necessity for "tailor made fuels" and precise maintenance.

VITAMIN C PREVENTS HEAT CRAMPS AND HEAT PROSTRATION

HEAT cramps and heat exhaustion, summertime menace to some people, but a year-round danger to men working in steel mills, foundries, ship-yards, in engine rooms of naval and transport ships and to troops in the tropics, can be prevented by doses of vitamin C, was stated by Dr. John H. Foulger, director of the Du Pont Company's

Haskell Laboratory of Industrial Toxicology. This vitamin has also proved effective in treating heat prostration when it does occur, Dr. Foulger said.

Vitamin C, the anti-scurvy vitamin of citrus and other fruits, is soluble in water. Consequently even people eating a normal amount of it in their food each day may lose large amounts by sweating it out as salt is lost from the body with the sweat. Salt loss has long been recognized as a cause of heat cramps and heat prostration.

The vitamin is apparently needed, Dr. Foulger explained, to maintain muscle tone both in the large muscles and in the small ones of the blood vessel walls. This tone, a slight but sustained contraction of healthy muscles occurring even when the body is at rest, is necessary to help move the blood in the veins back to the heart. In heat prostration there is a loss of tone and a consequent collapse of the circulation, aggravated by the dilatation of the skin vessels in an effort to pipe more heat-laden blood to the surface to be cooled.

Success of the vitamin C pills in preventing heat cramps or exhaustion was obtained in a trial of their effect on 30 men who had to do a repair job on a "hot spot" over a drying cabinet up under the ceiling of a plant in the south. On similar jobs in the past a number of men had suffered heat cramps and heat prostration.

These men were given two vitamin C tablets daily by the plant physicians. Not a single man suffered either heat cramps or exhaustion during the entire job, which lasted several weeks at temperatures usually far above 100 degrees Fahrenheit and with very high humidity. After the job was finished the men reported feeling just as fit as they had when working at ordinary temperatures and asked to be allowed to continue the vitamin C pills.

The morale vitamin, B₁, also dissolves in water and may be lost from the body with the sweat. So workers in this plant are now getting daily pills containing not only salt but also vitamins C and B to help protect them from heat cramps and heat prostration. The vitamin treatment has been recommended for workers in all ordnance plants which Du Pont is operating for the government.

THE TEACHING OF AIR AND MARINE NAVIGATION

THE importance of unified and simultaneous instruction in air and marine navigation, and the importance of training college students in the operational routine of navigation rather than in old-fashioned principles were stressed by astronomers discussing the teaching of navigation at the meeting in New Haven of the American Astronomical Society.

Dr. John Q. Stewart, of Princeton University, said that pretraining in navigation of the better-equipped college students had received the approval of high officials in the Navy. Service schools do not have time to insure the thorough mastery of navigation operations which are essential to avoiding disaster during military maneuvers, and they are also in great need of instructors in the paperwork of navigation.

College courses on navigation should include the latest methods of air navigation along with the older marine methods, Dr. Stewart said. This is particularly important

in view of the growing cooperation between surface ships and air forces, which requires mutual understanding among navigators.

"It is not necessary to have a preliminary course in trigonometry and logarithms," Dr. Stewart stated, "far less in spherical trigonometry." He stressed that navigation must be taught as an operational routine. "Graphical methods, linear interpolations, and judgment of tolerances should be taught well."

Standard Hydrographic Office terminology ought to be used by all books and teachers of navigation, regardless of whether in air or marine phases. Dr. Stewart regards it as troublesome that manuals of navigation have been written for civilian and army pilots which deviate unnecessarily from standard methods and nomenclature. He recommended that the college teacher use Bowditch, the navy aircraft manual, the maneuvering board manual, and Dutton's book on navigation.

Relative motion was stressed by Dr. Newton L. Pierce, also of Princeton, as especially important in modern warfare. Navigation also includes piloting, dead reckoning, radio navigation, celestial navigation, and problems. Of these, only celestial navigation is strictly astronomical, yet hundreds of astronomers are called upon to teach the entire subject in the war emergency. Their students, in turn, become instructors of civil air corps pilots, army and navy men, and in civil aeronautics courses.

"Relative motion," said Dr. Pierce, "has been under-emphasized and often badly garbled in the various texts which treat of it at all. It is true that relative motion has little use in peace-time marine navigation. It is, however, of great importance in war time for fleet maneuvers, and is important at all times for the air navigator. However, this is not a subject the student easily understands, and, therefore, it should receive considerable emphasis, particularly by vector solutions, which may be made easily and quickly. The Princeton astronomers recommended that the methods of solution of navigational problems used by the service schools be followed, and that the air almanac be used in preference to the nautical almanac wherever possible.

ITEMS

THAT the average length of life in America, at least among wage-earners and their families, has almost doubled during the past 60 years, is announced by the Metropolitan Life Insurance Company. Average length of life to-day, computed on the basis of mortality among the industrial policy holders of the company in 1941, is 63.42 years. During the period 1879 to 1889 early records show that the expectation of life for a one-year-old baby was 40 years. But deaths among infants were very much more frequent in those days than now. From other records relating to that time it is known that the expectation of life at birth, or the average length of life, was about 34 years, only a little over half what it is now. The average industrial policy holder 35 years old to-day still has as many years of life before him as the child in the wage-earning family of 1879 to 1889 had at the time of its birth.

WORK has started on three more 108,000-kilowatt Westinghouse generators, largest in the world, for the Grand Coulee Dam to power aluminum plants and other war industries in the Pacific Northwest. Three others of the giant units have been under construction since last August, and three are already installed at the dam. Each generator, big as a house, is 24 feet high, 45 feet in diameter, and weighs 1,000 tons. Thirty-eight freight cars are required to transport it in pieces to the dam. The largest single piece weighs 75 tons. The 74-foot shaft weighs 153 tons and is transported in three pieces. Ultimately Grand Coulee will have 18 of these 108,000-kilowatt generators, making it the largest power plant in the world.

METHODS of protecting radium during an air raid so that it will not be scattered by a bomb explosion have been recommended by the National Bureau of Standards. The rules were drawn up by a committee of physicians, engineers and scientists appointed by Dr. Lyman J. Briggs, director. They aim at safe storage of the radium with maximum protection and minimum interference with use. The committee advises extra precautions for 500 miles inland.

THAT malaria germs, and probably the germs of other diseases as well, can be frozen at temperatures colder than 100 degrees below zero in the Fahrenheit scale and kept at that extremely frigid temperature for as long as seven weeks without damage, is announced by Dr. Reginald D. Manwell, of Syracuse University. His method, so far applied only to germs of bird malaria, consists of instantaneous freezing of the germs in a small amount of the birds' blood in a test tube by whirling the tube at high speed in a mixture of alcohol and dry ice. Thawing within a few seconds is required to avoid killing the germs when the scientist wants to examine them or use them for other experimental purposes. Saving of urgently needed shipping space and reduction in expense will be one result of Dr. Manwell's achievement, since germs can now be shipped frozen in small containers from one laboratory to another, instead of in the bodies of guinea pigs, birds or other laboratory animals requiring bulky cages and special handling en route.

DISCOVERY of a method of preventing mercury poisoning among miners of this strategic mineral is announced by Dr. Merle Randall, professor of chemistry at the University of California. Because the war has cut off imports, the United States is now producing all its own mercury. Miners exposed to the vapors of free quicksilver, or mercury, however, are sickened and disabled and can only work a few days or weeks where the exposure is great. Careful ventilation, previous best method of prevention, has never been entirely satisfactory. Spraying the walls of mercury mines with a spray containing calcium polysulfide, Dr. Randall discovered, provides a coating through which the mercury can not vaporize. This method has been tested over a period of 11 months during which not a single case of mercury poisoning has been reported where the spray was used.