SCIENCE NEWS

Science Service, Washington, D. C.

PAPERS PRESENTED BEFORE THE WASHINGTON MEETING OF THE AMERICAN CHEMICAL SOCIETY

STRAWBERRIES, it seems, besides being a most tasty fruit, are excellent sources of scurvy-preventing vitamin C. Two grams of them, which is about one fourteenth of an ounce and not very much in terms of big, fat berries, fed daily to guinea-pigs protected the animals from scurvy and enabled them to make good weight gains. The berries do not lose their vitamin C content on freezing, so you may purchase the commercial frozen variety, if you prefer, and you may eat them in ice cream and still be getting this important vitamin. The good news was brought to the meeting by Professor Carl R. Fellers and Merrill J. Mack, of the Massachusetts Agricultural College.

COTTONSEED meal, valuable cattle feed by-product of the cotton industry, is a rich source of vitamins B and G, according to Professor May L. Whitsitt, of the Southern Methodist University. She found cottonseed meal richer in these two important factors than an equal weight of whole wheat, dried yeast or skim milk powder. Cottonseed oil shows no trace of either of these two vitamins, while the hull bran has a varying amount of the vitamins depending on the way it is extracted. Vitamin B is necessary to prevent the development of beriberi in man or a condition known as polyneuritis in birds. Vitamin G, also known as vitamin B_2, is said to be the factor in certain foods, notably yeast, that prevents pellagra in man and a similar condition, black-tongue, in dogs.

HOW much vitamin A there is in milk, and in the butter made from cream, depends to a considerable extent on the kind of hay the cow gets, as reported by Dr. E. B. Meigs, A. M. Hartman and H. T. Converse, of the U. S. Bureau of Dairy Industry. Dr. Meigs and his associates found that milk and butter produced on a basis of good alfalfa hay to be definitely richer in this essential vitamin than similar products based on a poor grade of timothy hay. High-grade alfalfa fed to dairy cows is reflected later in a rich natural yellow in their butter, indicative of a high vitamin A content.

VITAMIN B_1, preventive of the Oriental disease beriberi and other nerve disorders, has been obtained in crystals by Dr. Atherton Seidell and Dr. M. I. Smith, of the U. S. National Institute of Health. This achievement is considered important because it makes the vitamin available in pure form for chemical study. Dr. Seidell and Dr. Smith obtained a concentrate of vitamin B_1 from brewers' yeast by processes already known. This they treated with picrolonic acid, precipitating out substances of no vitamin value. The liquid left over, when evaporated, yielded a partially crystalline deposit, which after further purification gave them a quantity of prismatic crystals. These crystals appear to be the vitamin in pure form. Rats suffering from a deficiency of vitamin B_1 were cured with as little as fifteen thousandths of a milligram—about as much as you could pick up on the point of a pin.

FARMERS of the far future may keep pans of Penicillium instead of pens of pigs. For experimenters of the U. S. Bureau of Chemistry and Soils have found a species of mold, known botanically as *Penicillium javanicum*, that beats the hogs at the job of turning carbohydrates into fat. At the meeting of the American Chemical Society, G. E. Ward and L. B. Lockwood told of their researches on this and other fat-making molds. They found several species of Penicillium that contained a good deal of fat when well fed on glucose, but the one called javanicum was the champion of the lot. Its matted mass of white threads, when dried, contained from 20 to 43 per cent. of fat, depending on culture conditions. It takes only twelve days for the mold to produce the maximum quantity of fat out of the glucose solution. When they extracted the fatty material it came out as a reddish-orange oil, with a nut-like odor. A preliminary chemical examination showed it to be built up of the same constituents as many of the fats and oils that are now familiar articles of commerce. The new "mold-oil" is still in the experimental stage, and no definite commercial use for it has been suggested, but there is no doubt that industrial uses may some day be found for it if large-scale production makes it cheap enough.

DILUTE solutions of hydrochloric acid, alkalis and mixtures of hydrochloric acid and kerosene, are being used successfully in removing poisonous sprays from fruits before they are marketed. These measures have not solved all the problems of making fruit safe for consumption while at the same time protecting it from insect pests, but gratifying progress is made each year, according to Professor R. H. Robinson, of the Oregon Agricultural College. Professor Robinson addressed a special symposium of the society on insecticides. "The most important insect enemy of apples and pears, the codling-moth, can be held in check only by lead arsenate," he explained. Previous experience has shown that the maximum amount of arsenic that can be safely left on food is one hundredth of a grain of arsenic per pound of food, W. B. White, of the U. S. Food and Drug Administration, stated. Lead is also used in insect sprays of fruits and vegetables. Mr. White reported that as little as one tenth of a milligram of lead per day will produce serious symptoms if taken over a period of seven or eight years. Fluorine, another substance used in insect sprays, produced a condition known as mottled enamel in the teeth of children when the fluorine was present in drinking water to the amount of two to three parts per million.

E. F. KOHMAN and N. H. Sanborn, of the National Canners' Association, reported that the prune may find

new favor, together with fresh flavor, when it appears on the breakfast table fresh from the can. Lemon juice or possibly other fruit juices, being added to canned prunes in order to prevent corrosion of the can, improve the flavor. It is the citric acid of the fruit juices that prevents corrosion. The French or Santa Clara variety of prune must be dried in the first place in order to produce the most desirable flavor. But preparing a dried product for a meal is more of a chore than the modern housewife may care to undertake, so the industry is trying to simplify this culinary task by canning the prunes. Drying, however, increases the tendency of the prunes canned in syrup to attack the can. Citric acid, or lemon juice, takes care of this.

CALCIUM, claimed by some investigators to have a checking effect on cancer, failed in this respect in a large number of experiments on mice performed by Dr. M. J. Shear, of the U. S. Public Health Service. He transplanted cultured cancers of two types on to the bodies of some 1,200 mice, and administered three different chemical salts of calcium either in the drinking water, in the food or by injection into the body. But the results were all negative. Treatment produced no reduction in the number of takes. Slightly smaller tumors were sometimes obtained in the treated mice, but a definite, regular reduction in the size or in the rate of growth of the tumors was not obtained.

THE amount of pepsin in the stomach juice of patients suffering from stomach ulcer may give physicians a good index as to the progress and outcome of the disease. Drs. Arnold E. Osterberg and Francis R. Vanzant, of the Mayo Clinic, studied the pepsin concentration in the stomach juice of some 400 patients after an Ewald type of test meal. They found a correlation between the pepsin concentration and the severity of symptoms which indicated that the pepsin concentration is a valuable prognostic sign.

PROGRESS in the search for pain-relieving, sleep-producing drugs that are without habit-forming properties and may therefore be substituted for the dangerous morphine was reported by Dr. Lyndon F. Small, of the University of Virginia, and Dr. Nathan B. Eddy, of the University of Michigan. The researches described by Drs. Small and Eddy are being carried out under the direction of a special committee of the National Research Council. One phase of the research has consisted in changing the arrangement of the morphine molecule and then observing the pharmacological effects of the altered drug. Certain changes in the chemistry of morphine always produce certain changes in its effect.

THE thyroid gland, important in the regulation of bodily functions, varies in size according to age, and also fluctuates in size according to the season of the year. These observations were reported by Harry von Kolnitz and Dr. Roe E. Remington, of the South Carolina Food Research Commission. Messrs. von Kolnitz and Remington examined the thyroids of 150 human bodies in Charleston. They found that up to the age of forty, human thyroids increased in size; after that they declined steadily. Women's thyroids averaged larger than men's, but contained a lower percentage of iodine. Thyroids varied seasonally, increasing in weight from April to a peak in July and then decreasing to a constant level from October on through the winter. This latter result disagrees with findings of earlier investigators.

HOW the hemoglobin-producing factors of human liver are affected by various diseases was reported by Dr. G. H. Whipple, of the University of Rochester School of Medicine. Dr. Whipple was one of the pioneers whose investigations led to the liver treatment for pernicious anemia, in which disease the hemoglobin content of the blood is somewhat reduced. Acute infections reduce the store of these potent hemoglobin-producing factors in the human liver somewhat. On the other hand, chronic intoxication had very little effect. In cirrhosis or inflammation of the liver there was a marked reduction in the amount of the hemoglobin-producing factors. Pernicious anemia showed very high values for these factors. Secondary anemia due to loss of blood showed low normal values, but even long standing severe anemia will not seriously deplete this store of hemoglobin-producing factors in the liver. In anemia due to loss of blood there may be complete dissociation between the iron content and the concentration of hemoglobin-producing factors.

MOLDS are usually thought of as fungous growths that spoil things; but they can be chosen to turn their "spoiling" activities in useful directions. Research scientists of the U. S. Bureau of Chemistry and Soils described recent progress in the taming of the aspergilli and the penicillia. Two tasks at which molds have proved themselves efficient workers have been the production from glucose solutions of citric and gluconic acids. The former is the familiar acid of lemons; the latter is a rarer acid, of possible use in medicine and industry, which, thanks to the work of the government investigators, now costs dimes a pound where it used to cost dollars.

COLORED fabrics that fade on exposure to light are not fading in the same way that they do when their colors are "washed out" in the laundry. The latter process is merely a reversal of dyeing—the dyestuff merely becomes "unstuck" and diffuses out into the water. Sun-faded fabrics have their dyestuffs actually changed over into other substances, which may have colors of their own. This accounts for the fact that a sun-faded fabric may not merely be paler than it was when new, but may have a quite different hue. These facts about sun-fading were brought out by William D. Appel, of the U. S. Bureau of Standards, and William C. Smith, of the Lowell Textile Institute.

SYNTHETIC stone, made from plentiful shale deposits

or waste limestone, marble, granite and slate quarries, will rival present building materials and compete for the job of entering into the construction of skyscrapers and homes of the future. This was predicted by Professor R. Norris Shreve, of Purdue University, in presenting details of rostone developed in Purdue laboratories by R. L. Harrison and Professor H. C. Peffer. Pulverized limestone and shale, after being properly mixed and moistened to earth dampness, is pressed in a polished steel mold, under a pressure of 2,500 pounds per square inch. The mold is then permitted to dry for a time, later going into an "indurator" which is heated by steam. There the chemical reaction takes place, working as a binder in bonding the particles of limestone together. The pressed block or slab of limestone and "matrix" is then ready for immediate use or it may be polished the same as granite, or marble. The entire process of grinding, mixing, pressing, "steaming" and finishing takes barely a half day, thus giving in a few hours this man-made stone, which nature requires decades or centuries to produce.

GAS stoves and other gas-burning appliances that are safe and suitable for use in low altitudes need to have their "settings" for gas and air flow set differently for safety in high-altitude cities like Denver. J. H. Eisemann, Dr. F. A. Smith and C. J. Merritt, of the U. S. Bureau of Standards, reported on their experiments on the changes needed in gas appliances for safe operation at high altitudes. In general, they found that the maximum safe rate for the supply of gas at sea-level, measured in heat units consumed per hour, is reduced by approximately three to four per cent. for each thousand feet of altitude; but the number of cubic feet per hour of gas of given composition which can be burned completely is practically independent of altitude. The area of flue opening which will permit the flow of enough air to insure complete combustion increases somewhat more rapidly than in proportion to the altitude at each gas rate, and this effect is the greater the higher the gas rate.

WHEN a man falls victim to a fire, if he is not burned outright he is frequently said to be "suffocated by the smoke." But in many cases he is killed by something much more deadly than smoke. Many common household things give off some of the most toxic of poisonous gases, Professor John C. Olsen, of Brooklyn Polytechnic Institute, reported. Professor Olsen has as collaborators in his investigations George E. Ferguson and Leopold Scheflan. The gases from all types of fires investigated contain toxic constituents in sufficient amount to make breathing the gases dangerous or even fatal in a relatively short period. They vary greatly in toxicity. Those most toxic come from substances containing nitrogen or sulphur or both of these elements. Textiles such as clothing, draperies, etc., cotton and rayon produce the least toxic gases, while silk and especially woolens give off hydrogen sulphide, hydrocyanic acid, sulphur dioxide and ammonia, as well as carbon monoxide.

MOTION-PICTURES showing how ultra-violet light of certain wave-lengths kills cells were shown by Dr. Ellice McDonald, Alexander J. Allen and Rachel Franklin, of the University of Pennsylvania. They used cells from the spleen for their experimental material, and the wave-lengths turned on them ranged between 4,350 and 2,253 Ångström units. The wave-lengths that were fatal to the cells killed in from fifteen to twenty seconds. The living protoplasm of the cells became greatly agitated, bubbles appeared on the membrane and as a rule the cells finally burst. The killing effect of the shorter ultra-violet light can not be equaled by fifteen hours of exposure to strong radiation from radium, nor is the lethal effect of ultra-violet light equaled by twelve to twenty-four hours of exposure to high-voltage x-rays.

CHEMISTRY, which has contributed so essentially to America's economic progress, is in this depression helping to camouflage inferior quality merchandise. This danger was pointed out by H. L. Derby, president of the American Cyanamid and Chemical Corporation. "One of the notable incidents of the present depression is the demand for low-priced merchandise, quality being one of the lesser considerations—quite the reverse of the prosperity type of demand," said Mr. Derby. "In past generations the distinctions between good and cheap merchandise were readily discernible by the most inexperienced observer. However, modern chemistry has largely eliminated the superficial differences by neatly and attractively covering up the inferior quality." Chemistry's large contribution to America's industry and independence from foreign sources of essential materials were cited by Mr. Derby, who also predicted the future course of this science applied to industry.

NOT all the ancients who labored mysteriously with beakers and alembics were mere alchemists, either muddle-headed themselves or deliberately out to fool their neighbors. There were real chemists among them, who knew that the "gold" they were making out of base metals was not real gold. So Professor Tenney L. Davis, of the Massachusetts Institute of Technology, reported. The chemists of ancient Alexandria knew the difference, he said, and so did the medieval genius Albertus Magnus, the earliest scientist to be canonized as a saint. Albertus, said Professor Davis, wrote in his "De Alchimia" that the gold of alchemy is identical with real gold "in every test and hammering"; but he also wrote in another part of the same book that "the gold of alchemy does not gladden the heart of man, nor cure leprosy, and wounds fester which are made by it." This indicates that Albertus knew that "the gold of alchemy" was brass. Apparently independently of the West, the Chinese invented a system of alchemy about the third century B. C. The Chinese alchemists hoped to produce actual immortality by chemical means, and to become "hsien" or supernaturally endowed, benevolent immortals. Professor Davis also set forth the reasons for believing that Arabic alchemy was derived from that of the Chinese.