SCIENCE NEWS

ISOLATION OF VITAMIN A

Science Service

THE Chemical Society of Japan announces what they believe to be Vitamin A has been successfully isolated by two Japanese chemists, K. Takahashi and K. Kawakami. If this actually has been done it is likely to prove an important event in the progress of food chemistry.

Vitamin A, the fat soluble vitamin, is perhaps the most important of these mysterious substances now definitely known to exist. Its absence in food gives rise to rickets in children. It is closely connected with the growth of children and young animals. It is abundant in butter, egg yolk, cod liver oil, milk, cream and most oily animal fats. Certain fresh vegetables, such as cabbage, spinach, tomatoes and lettuce, have some of this vitamin. Long exposure to heat gradually destroys it, but ordinary cooking seems to have no effect.

Hitherto nothing has been known concerning its chemical structure and very little about its properties. The Japanese chemists, however, have analyzed the substance they obtained. Whether or not it is vitamin A remains a question for further verification. They isolated it from cod liver oil, butter and egg yolk. After an involved chemical process a semi-crystalline substance was obtained, constituting about one tenth of one per cent. of the original material. This was found to be composed of carbon, hydrogen and oxygen, with no nitrogen. A mouse at the point of death because of lack of vitamin A was given minute quantities of the substance daily and in ten days was restored to complete health.

Vitamin A has been considered in the nature of a catalyst, an agent with the power of bringing about extensive chemical changes without being itself altered in the process.

PINEAPPLES AND IRON

Science Service

PINEAPPLES with leaves pale and anemic for lack of iron, starving for iron though there was plenty of it in the soil, and cured finally by being sprayed with an iron solution, are actors in a strange romance of botanical research reviewed by Dr. William Crocker, director of the Boyce Thompson Institute for Plant Research.

A report to the Engineering Foundation states that the drama began when pineapple planters found that their crop was afflicted with a strange disease that made the leaves yellow and sickly-looking and of course greatly diminished the yield. Plant physiologists quickly demonstrated that the disease was simply iron starvation —for plants must have iron to make their leaves green just as animals must have it to make their blood red.

But chemical analyses showed that there was plenty of iron in the soil, also great quantities of lime, which had always been supposed to be "good for plants." Then followed the discovery that if there was too much lime the iron was not sufficiently soluble for plants to get it. The lime locked the iron up. Where the soil contained a great deal of manganese the story was the same. And since the two principal pineapple-growing regions under the American flag were thus afflicted—Porto Rico with too much lime, Hawaii with too much manganese—the situation looked serious.

Then a researcher for the Department of Agriculture, working in Porto Rico, found that these sick pineapples could be made healthy again by spraying their leaves with a solution of iron sulphate. Fifty pounds per acre, sprayed on the leaves, effected a complete cure; although 3,000 pounds per acre applied to the soil made no difference whatever—the lime took it all.

The new method of assuring that pineapples "have their iron" at regular intervals has greatly increased the pineapple yield in both Porto Rico and Hawaii. The export of canned fruit from the latter region has exactly doubled.

This method of distributing iron by spraying has lately come to have other applications. In many federal pine tree nurseries in the west, where alkaline soils are common, the seedlings developed the same iron-starvation symptoms, which have been successfully overcome by iron sulphate sprays.

Directly or indirectly, animals and men get most of their salts from plants. A few years ago on certain pasture lands of New Zealand, sheep and cattle developed "bush sickness." This was an iron-deficiency disease. It was later found that if the plants in these pastures were sprayed with iron sulphate and certain other salts, the sickness disappeared.

AMERICA'S FIRST AIR LINER

Science Service

AMERICA'S first giant, passenger-carrying airship, now being prepared for its trans-oceanic flight from Friedrichshafen, Germany, to Lakehurst, New Jersey, may be sent across the continent soon after its delivery to the United States, according to tentative plans under consideration by the Navy Department here. Mooring masts for the accommodation of the big aerial liner have been erected at Fort Worth, Texas, San Diego, California, and Camp Lewis, Washington.

Before starting this more protracted cruise, short trips will probably be made from Lakehurst to determine the exact difference in behavior in the air of the new commercial ship as compared with the *Shenandoah.*

The new ship is not a sister ship of the American-built *Shenandoah,* designed in 1916 as a military auxiliary. The ZR-3 is strictly a peace-time air liner with Pullman accommodations for twenty passengers, especially designed in 1921–22 to meet the requirements of greater safety and comfort demanded of a commercial craft. It will be used to test the commercial possibilities of lighter-than-air traffic. Hydrogen gas will be used by the Germans in their flight across the Atlantic, but the ZR-3 will be converted for the use of helium after it is received by the navy.

The new ship was built by the experts of the famous Zeppelin Company who have made 125 dirigibles. This is the first ship, however, which was specially designed for its great size. Previous big ships were merely expanded to their mammoth proportions from the designs for smaller ships.

The ZR-3 is larger and faster than the *Shenandoah*, although not so long. It measures 658 feet in length, whereas the *Shenandoah* measures 680 feet. Its diameter, however, is 91 feet as compared to 78 feet for the *Shenandoah;* making it somewhat stockier and giving it a greater gas capacity, 2,400,000 cubic feet as compared to 2,115,000 cubic feet.

The passenger ship is equipped with five twelve-cylinder 400 horse-power Meybach direct reversing motors which will drive it at a top speed of 75 miles an hour, whereas the five six-cylinder 250 horsepower Packard engines of the *Shenandoah* give it a top speed of 60 miles an hour. At 75 miles an hour, the ZR-3 can go 4,000 miles without refueling and at 60 miles an hour can go 6,000 miles. She carries a crew of 44 besides her twenty passengers. The *Shenandoah* has a crew of 31.

CARBURETOR ADJUSTMENT

Science Service

THE average motor vehicle wastes about 30 per cent. of the heat value of the fuel used through improper carburetor adjustment.

Such is the conclusion reached by scientists of the United States Bureau of Mines as the result of a study of the efficient utilization of gasoline. The figures were obtained largely by measuring and analyzing the exhaust gases. The waste was found in the production of incomplete combustion products—carbon monoxide, hydrogen and methane. Loss of heat value, the bureau points out, means also loss of mileage. By properly adjusting the carburetors for maximum power and efficiency a large part of this heat loss can be eliminated. The experiments were carried on with a number of different fuels.

Among the practical conclusions reached by the bureau are: (1) Change the carburetor adjustment when shifting from low-test to high-test gasoline. (2) Set the carburetors at a leaner adjustment for benzol fuels than for ordinary gasoline. (3) Use a preheater only when necessary, that is, only with gasoline which will not give satisfactory operation without preheated air during cold weather or for the first half hour after the engine has been started and before it is thoroughly warmed.

LEAD-EATING INSECTS

Science Service

HOW to get the better of an insect that eats holes in lead-covered cables and causes as much as one fifth of all wire troubles encountered by telephone companies in certain parts of the United States is the problem which is now being attacked by entomologists of the U. S. Department of Agriculture.

The insect is small and inconspicuous enough, being a stocky little black beetle about three sixteenths of an inch long, with a square-cut, blunt head and jaws very powerful for their size. It attacks the lead cables mainly where the suspension rings give it a foothold and permit the accumulation of moisture. Since its normal food is wood, particularly oak, it is difficult to understand why it should choose such an unnutritious variation in its diet; though some have conjectured that it is after the insulating material inside, which may possibly be appetizing to an insect.

Efforts to stop the depredations of the beetle have not so far met with much success. Nothing seems to be able to stop its gnawing jaws except steel, and nothing seems to be poisonous to it. Lead arsenate, creosote, carbolineum, copper, nicotine sulphate, sodium silicate, naphthalene (moth ball) compounds, spar varnish, and a number of other materials were tried as protective measures, and the beetle calmly ate through all of them with good appetite.

The lead-boring beetle has a number of other insect relatives who turn aside occasionally for a snack of something really worth chewing on. Representatives of at least half a dozen families have been found going through such things as tin, zinc, silver, asbestos, the gilding on chandeliers, and the mercury coating of mirrors. Bugs sometimes go in for a chew of plug tobacco, but they are the mollycoddles of really tough six-legged society.

THE BURSTING POWER OF HYDROGEN GAS

Science Service

HIGHLY compressed hydrogen gas has a tremendous bursting power all out of proportion to its pressure, according to Dr. P. W. Bridgman, of Harvard University, in a recent report to the American Academy of Arts and Sciences.

A chrome-vanadium-steel cylinder in preliminary tests withstood the enormous pressure of 160 tons per square inch, but succumbed to only 60 tons pressure when hydrogen was doing the work. Hydrogen is the most finely divided form of matter known. Apparently its extremely small molecules squeezed their way amongst the steel particles and demolished their structure.

At these excessive pressures the repulsion of hydrogen molecules of each other becomes stupendous. In Dr. Bridgman's experiments hydrogen even at the highest pressures could not be concentrated into a form as dense as common cork. At 60 tons pressure a quart of the gas weighed only three ounces—a fair rating for a quart of feathers not too well packed. It required over 90 tons pressure to force the molecules together shoulder to shoulder, that is, barely to eliminate the empty space which normally constitutes most of the volume of a common gas.

All known laws of gas pressure familiar to gas engineers break down at the extreme pressures of Dr. Bridgman's experiments. As was anticipated, it was not found possible to liquefy hydrogen by pressure alone, despite the fact that the pressure of 90 tons per square inch was able to pack the gas into half the space that the substance occupies as a solid under conditions of extreme cold.

THE DEATH RATE

Science Service

THE first half of 1924 has probably registered a lower death rate than was ever experienced for the first six months of any year in the history of the United States and Canada. This is indicated by the mortality records of the industrial policyholders of the Metropolitan Life Insurance Company, by its statistical department which has completed an analysis of the data.

After an uninterrupted rise for four years, a decline in the diabetes death rate began coincident with the increasing use of insulin in 1923. For the first six months of 1924, the fall amounted to 27.5 per cent., among the white policyholders and to more than 10 per cent. among the colored. Although there is, as yet, no positive proof that the reduction is the direct result of the increasing use of insulin, there is good reason to hope that the two phenomena are connected.

The cancer death-rate was a little lower than that in evidence at this time last year. The death-rate from alcoholism declined slightly. Deaths from acute poisoning by wood and denatured alcohol appear to be decreasing in the industrial population. Fatal accidents showed a little more satisfactory record. The death rates from automobile fatalities continued to increase—only slightly among the whites but about 10 per cent. among the colored. There have been fewer suicides.

The typhoid fever rate is still falling and there is promise that a new minimum will be registered in 1924. Diphtheria mortality in the industrial population has been running lower than ever before. Scarlet fever and whooping cough, it is true, show practically the same death rates as for the corresponding period of last year. however, this really indicates improvement, in view of the much greater number of infant lives exposed to risk and covered by the data this year. There has been no general prevalence of epidemic influenza thus far. The mortality from lobar pneumonia decreased markedly among the white policyholders and slightly among the colored. Bronchial pneumonia caused more deaths than during the same period of last year; but this, again, was due to the relatively high number of infants concerned. An increase in the rate for diarrheal diseases is explained on the same ground. The mortality from diseases incidental to pregnancy and childbirth declined among white women, but this improvement did not obtain for colored women.

MERCURY BOILERS

Science Service

THE value of boilers using mercury vapor in the place of steam in power plants is justifying all expectations, according to a statement by Dr. W. L. R. Emet, consulting engineer of the General Electric Company, addressing the World Power Conference in session at London. The efficiency of mercury vapor for developing power lies in its use of extremely high temperatures without excessive pressure and its adaptability to turbine engines. Also the heat of condensation can be used for making steam for auxiliary power or for other purposes.

The continued operation of a mercury boiler and turbine at the Dutch Point Station of the Hartford Electric Light Company has suggested modifications and improvements without developing additional difficulties. Special boilers and fittings must be used suitable to the temperatures used. Leakage of mercury and mercury poisoning appear to be entirely avoided. Repeated measurements of the fuel used and the energy delivered shows a saving of 50 per cent. in fuel with the mercury engine, together with other advantages of reduced space occupied and amount of water required. Mercury power is well adapted to locomotives and boats. The studies indicate a saving of 60 per cent. in fuel with inprovements based upon the experience acquired at Hartford.

The supply of mercury for the increased demand which may follow a more general use of mercury for power purposes does not seem to be limited. Abundant sources of mercury are known and require only a slight rise in price to bring it upon the market, and other sources of supply will doubtless be revealed.

ITEMS

Science Service

THE Chinese starling or crested mynah, perhaps the largest and most beautiful of the wide-spread starling family, has obtained a firm foothold about Vancouver, B. C. The certainty that this oriental visitor will extend its range has caused considerable anxiety along the Pacific coast for, like all starlings, it has a reputation for raiding fruit orchards. The bird now has a radius of about 50 miles about the Vancouver water front. It is advancing in all directions about a mile a year, according to local bird students. An individual specimen has been noted as far south as Portland, but it is not certain that this was not an escaped cage bird. This starling is about the size of a robin with a yellowish white bill overhung by a fan-like crest. Its glossy black plumage is in striking contrast with a large, white marginal wing patch. It makes a god pet, but in the wild state it is a marauder, and steals the eggs and nests of other birds. While little effort has been made to eliminate the visitor it is regarded as decidedly an undesirable by R. F. Butler, secretary of the British Columbia Game Conservation Board.

RAILWAY chemical engineers have produced a special lubricant from castor oil which is now being used with great success on the Chinese Eastern Railway. According to the traction department, it makes a most economical and efficient car lubricant. The manufacturers of this new oil have named it "Ricinol" from the scientific name of the castor oil plant (*Ricinus communis*). Castor oil is coming to be used most extensively for technical as well as medicinal purposes and in China it is also used as food. During the past few years there has grown up in Manchuria a demand for Ricinus seeds as well as for technical castor oil, which are exported to Europe. The seeds are extremely rich in oils, certain species containing up to 63 per cent. This demand for seeds has caused an increased acreage to be planted under the castor oil plant.