SCIENCE NEWS

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WORLD NITRATE SUPPLIES

DR. F. G. COTTRELL, director of the Fixed Nitrogen Research Laboratory of the U. S. Department of Agriculture, reports to Science Service by radio from Biarritz, France, that nitrates manufactured out of the air, which a decade ago were an intensely national concern of importance chiefly in the destructive business of war, are now an international concern of basic importance to agriculture, being discussed at Biarritz by nations only a few years ago at war with each other. America, Belgium, France, Germany, Great Britain, Holland, Italy, Java, Norway and Sweden, at once the chief producers and the largest consumers of artificial nitrates, are represented here by scientists and economists whose hope and ambition is mutual cooperation in the capture of more and more of the vast, scarcely tapped mines of nitrogen in the air all about us, to be chemically fixed and eventually turned into food for the increasing millions of the earth's population.

Through improved methods in nitrogen fixation and a stabilization of marketing, continuing decreases in fertilizer costs to farmers are in plain prospect.

Of perhaps even greater importance are the contributions of botanists interested in agriculture. Not contented with merely renewing the natural nitrate supplies in the soil, the agricultural scientists are undertaking programs of "forced feeding" of plants, comparable with the fattening-up processes used in preparing animals for the market. Plant physiologists have recently learned that properly calculated overdoses of nitrates will induce plants to produce fruits or heads of grain earlier and in larger quantity than normal. Geneticists are at work in an endeavor to breed new strains that can take up even greater amounts of nitrates than the ordinary breeds of plants now under cultivation are able to use. Professors Erwin Baur and Herman Warmbold, of Berlin, and the great Swedish plant breeder Hermann Nilsson-Ehle, stated that a program of several years' experiments could make such "nitrogen-greedy" plant varieties a distinct possibility; and Dr. Karl Bosch, of Berlin, and Ferdinand Speyer, of London, stated that the nitrogen industry is planning to spend millions on such research.

Agricultural education in the most advantageous methods of nitrate use has also come in for its share of attention. Especial stress was laid on the desirability of improved methods of distribution of concentrated nitrate fertilizers in regions where transportation facilities are poor, notably in the tropics and in India and China. Improvements in agricultural conditions made possible by the use of cheaper concentrates in regions now periodically threatened with famine are expected to go far to avert these calamities, which in the past have not only been a scourge to the afflicted populations but a cause of social and economic disturbances throughout the world.

THE BRITISH FOOD SUPPLY

WHAT is the state of the English cupboard? This question, which was so important during the world war when German submarines threatened to cut Great Britain off from the outside world, is being asked again as the industrial strike continues, and estimates made in America are as likely to be reliable as what is coming now by cable.

The war emergency brought out surveys and investigations of the entire British food question, and efforts were made to encourage home production of grains and other foods. But the present situation finds England with a food supply on hand that is a little below the normal stock for normal times when shipments are steadily coming in.

Imports of wheat and flour are lower this year than at similar periods last year. April figures show that the wheat supply at British ports is 4,000,000 bushels less than last year. And how much of the 7,720,000 bushels of wheat at the ports will be turned into flour by the mills during the strike is uncertain. Home-grown wheat provides only one fifth of Great Britain's needed supply of this important item of food.

Stocks of bacon at Liverpool during March of this year were lower than last and stocks of ham amounted to only a little over one fourth of the stock held at the same time last year. Beef imports are a little higher than last year and mutton a little lower. The great bulk of the milk supply is home-produced and special efforts are being made to distribute it as it is the most vital article of food for young children.

The British people will be better off when it comes to fruit and vegetables, in the opinion of Edwin Smith, assistant chief marketing specialist in the U. S. Bureau of Agricultural Economics, who has just returned from London. There will be no acute shortage of potatoes, on which the British housewife relies so heavily, and while this is not a season for large stocks of home-grown vegetables, the southern markets have been regularly sending shiploads of spring produce to British ports.

"This is the peak of the season for Australian and New Zealand apples to reach England," said Mr. Smith. "Whether the cargoes will be unloaded, however, is another question. It is likely that commission merchants will use their own trucks to handle the fruit and get it from the docks to market. Cabbage and cauliflower have been coming in from France and Italy and new potatoes from North Africa, and these cargoes face the same situation at the docks. Undoubtedly the commission merchants and the farmers will be able to transport quantities of vegetables and fruit on lorries."

Mr. Smith points out that while the British population has continued to increase, land under cultivation in the United Kingdom has decreased. It was asserted during the world war that the country might conceivably make itself independent of other nations for its food supply, but to do this it would have to abandon or greatly diminish many of its most important manufacturing industries. The present emergency can not be met by plans for increasing future harvests, but it may again stimulate interest in farming among the British people.

THE CAUSES OF CANCER

CANCER is caused by the related operation of several factors, rather than by a single cause. This is the conclusion reached by Dr. Leo Loeb, of Washington University, after many years of research on breast cancer in mice.

Since 1910 Dr. Loeb has been collaborating with Miss A. C. E. Lathrop, of Granby, Mass, on inbred strains of mice in order to determine what effect family predisposition has on the incidence of spontaneous cancer. Recently, Dr. Loeb's results have been verified by Dr. C. F. Cori, of the Institute of Malignant Diseases in Buffalo.

Briefly, Dr. Loeb believes that hereditary disposition, in the case of mammary cancer in mice, plays a very important rôle in the spontaneous development of the disease, but that heredity alone is not decisive. The presence of certain internal secretions is essential to supplement or cooperate with the animal's innate sensitivity. When these secretions are withheld, the animals do not so readily develop the disease—a discovery that may have important practical bearing on efforts to prevent cancer or at least to lower the cancer rate among human beings.

In dealing with the causes of cancer, the problem always narrows down to the question, what makes this particular group of cells *grow* so outrageously. Various causes have been and are continually being suggested to account for this misplaced energy, from microorganisms to the psychic condition of "worry." It is known that continued irritation of a mechanical or chemical sort can induce cancer, but the spontaneous development of the disease, the sudden rush of energy, the "will to grow," on the part of a particular group of cells, for no visible reason, is baffling.

Dr. Loeb established the fact that among mice inbreeding of different strains produces families with distinctly different degrees of susceptibility to cancer of the mammary gland, which is the most common form of cancer among mice. He felt convinced, therefore, that heredity plays an important rôle in the spontaneous appearance of cancer among mice and, in all probability, that it also plays an important rôle in cancer incidence among human beings although the usual statistical methods fail to reveal the importance of heredity. Dr. Loeb found that some mice families showed as high as 60 or 70 per cent. cancer rate while others showed only 4 or 5 per cent. or even less. He found, however, that the hereditary influence could be checked in female mice by cutting off the supply of internal secretion from the ovary. The normal growth of the mammary gland is dependent upon the hormone from the ovary and similarly the excessive, abnormal growth of cancerous tissue in the mammary gland is influenced by the ovary secretions. By removing the ovary at the age of six months or less, just after the mouse is sexually mature, Dr. Loeb was able to lower very decidedly the cancer rate. In strains where the normal rate was 60 to 70 per cent, the castrated mice showed a rate of only 11 per cent.

Dr. Loeb concludes that the causes of cancer are complex and that the balance of different factors, hereditary sensitivity and the supply of internal secretions, beside whatever external stimuli may be applied, must be studied quantitatively in order to give greater insight into the cause and prevention of the disease.

COOPERATION BETWEEN THE MEDICAL AND DENTAL PROFESSIONS

AT a meeting of the Maryland State Dental Association Dr. Lewellys F. Barker, of the Johns Hopkins Hospital, recently urged closer cooperation between the dental and medical professions is necessary to ascertain just how far mouth infections are responsible for disturbances to the general bodily health. Neuritis, several varieties of rheumatism, nephritis, inflammation of the eye and secondary anemias were cited as conditions that frequently appeared as sequels of primary infection in another part of the body.

Dr. Barker considers that there has been a great deal of over-emphasis upon the importance of such focal infections and he scores heavily the present-day tendency toward the wholesale removal of teeth without well-grounded justification. It is particularly difficult to reach a conclusion in such cases because the infections of the mouth region are a secondary cause of the accompanying disturbances unlike the diseases where a specific organism is the culprit. There has in consequence been much doubt and speculation and considerable experimentation. This is the reason, according to Dr. Barker, why this field has been so accessible to over-enthusiastic, insufficiently experienced practitioners.

To keep the middle path of sanity between faddish diagnosis and culpable failure of recognition of important disease processes is difficult but necessary to every member of either profession. If the public is to reap the fruits of the knowledge that actually exists in regard to the relation of mouth infections to other bodily disturbances, the leaders in both branches must exert to the utmost their protective influence against the practices of certain members of their respective professions.

In the present state of knowledge of the whole subject it is very difficult to decide conclusively when a tooth should be removed and when it should be retained. Both professions should be very cautious to avoid premature application of findings that are not supported by sound observation and experimental evidence.

Dr. Barker concludes with a decided rap at what he calls pseudo-research in medicine and its special branches including dentistry. The general haste to rush into print with results that are not sound is harmful to both the public and the less well-informed practitioners. The intellect and imagination of the research worker should be of high order, and the work should be under the direction of experienced investigators. The mistakes of work so conducted will be fewer and less serious than those of workers of less ability and experience. The face of the medical professions generally should be set against pseudo-research that is irresponsibly undertaken and is inaccurately conducted. It is a degradation to science and misleading to the public that the true scientist tries to serve.

THE ALLEGED TRANSMUTATION OF GOLD

A SCIENCE SERVICE correspondent from Berlin reports that a reversal of the dream of the ancient alchemists, the transmutation of gold into a less valuable metal, mercury, is claimed by Dr. A. Gaschler, an associate of Professor A. Miethe, who in 1924 announced that he had succeeded in turning mercury into gold.

Dr. Gaschler's process consisted in sealing a gold electrode into a vacuum tube and bombarding it with a stream of positive hydrogen atoms, shot through the tube at high velocity. The resulting color display Dr. Gaschler watched through a spectroscope. At first the only light given off was of the color characteristic of glowing hydrogen, but at the end of thirty hours of bombardment the spectrum lines that indicate the presence of mercury appeared and became stronger as time elapsed.

The experimenter states that an oil pump was used to produce the vacuum, and that every other precaution was taken to prevent the contamination of either the gold electrode or the hydrogen gas with mercury. He is confident that he has actually produced mercury from gold.

Dr. Gaschler calls attention to the similarity of his work to that of a British physicist, J. J. Manley, who succeeded in inducing helium to form a chemical union with mercury by bombarding mercury with a stream of helium atoms. Helium had long been known as one of the most inert of the elements, never forming compounds with any of the others.

He is of the opinion that if his results are confirmed upon further repetitions and refinements, they will lend support to Dr. Miethe and Dr. Hantaro Nagaoka, whose claims that they changed mercury into gold have been subjected lately to skeptical criticism.

AN INSTRUMENT TO RECORD THE INTENSITY OF STATIC

MOST radio fans are not sufficiently fond of static to want to keep a careful record of it, but since the intelligibility of a radio signal in a receiving set is determined by the ratio of the strength of the signal to the intensity of static, radio engineers want to know its ups and downs.

In a new instrument devised by H. T. Friis, an engineer in the Bell Telephone Laboratories, the static is made to write its own record.

Instead of measuring directly the amount of static, Mr. Friis uses a specially constructed receiving set in which the output, due to the static, is kept constant. This is done by an amplifying system which increases or decreases the amplification according to the weakness or strength of the static. Such a system is necessary, rather than a constant amount of amplification with measurement of the output, because the static varies so greatly in strength. According to Mr. Friis, the change is generally as much as from one to a hundred in a day and sometimes from one to ten thousand, so that with constant amplification it would be difficult to avoid overloading the tubes.

A fluxmeter, an instrument to measure the quantity of electricity, is connected with the receiving set in place of a loud speaker. When the pointer goes past certain limits, either too high or too low, an electric contact is made which takes out or puts in some amplification. A pen, connected with a sliding contact that regulates the amount of amplification, writes on a moving strip of paper the line which indicates the amount of static.

Mr. Friis states that the invention of the instrument is too recent to have yet given any comprehensive data, and he suggests that by using a slowly rotating loop antenna in the set, not only the intensity but the direction of the static may be automatically recorded.

ITEMS

THE lowly spud is an important source of vitamin B—the antineuritic vitamin, whose lack causes the disease known as beri-beri. According to F. J. Lyman and Inez Blystone, of the Laboratory of Applied Chemistry at Ohio University, this essential element is distributed about uniformly throughout the potato and is stable both during cooking and storage. Measured in calories, the white potato furnishes about twelve per cent. of the American dietary. Mr. Lyman and Miss Blystone have conducted a series of experiments in which they have found that rats thrived and grew at a normal rate on a diet containing as much as eighty per cent. potatoes. When put on a diet of only forty per cent. potatoes from which other foods containing vitamin B were excluded, the rats showed a rapid decline in condition which disappeared as soon as a sufficient quantity of vitamin B was again supplied.

HYDROCYANIC acid, one of the most poisonous insecticides in use, can now be prepared in a stable powdered form. Since this efficacious bug-killer has previously been available for trade purposes only in solutions that decompose in concentrations of any very great strength, the powdered form is regarded as a highly desirable improvement. F. C. Metzger, in a report of his process for the production of this form of hydrocyanic acid to *Industrial and Engineering Chemistry*, says that the powder lends itself to all sorts of fumigating where dusting apparatus can be used. Dusting has likewise proved a most effective and penetrating method of treating fruit trees for various pests, and has to a certain extent replaced spraying. Kept in air-tight containers, powdered hydrocyanic acid remains stable at all ordinary temperatures, decomposing only on contact with moisture.

IN experiments at the Geophysical Laboratory of the Carnegie Institution of Washington that simulate the conditions of extremely high temperature and pressure of the earth's interior, Dr. Leason H. Adams and Dr. Ralph E. Gibson have found that rocks have much more elasticity than was formerly supposed. In a report to the National Academy of Sciences Dr. Adams said that they had found that the least silicious of the silicate rocks, known in geological parlance as Dunite, when subjected to very high pressures was three fourths as rigid as steel. The calculations of the two experimenters have been found to tally with seismological data which definitely establishes that the main part of the earth consists of perioditic rock or the stuff that meteors are made of.