SCIENCE NEWS

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RADIO-ACTIVE SODIUM PHOSPHATE AND LEUKEMIA

PROFESSOR ERNEST O. LAWRENCE, of the University of California, speaking before the New Orleans meeting of the American College of Physicians, reported that radio-active sodium phosphate may be the life-saving weapon of the future against leukemia. Eight patients suffering from this always fatal cancer-like disease of the white cells of the blood are being given this treatment now at the School of Medicine of the University of California.

It is much too soon, Professor Lawrence emphasized, to be sure whether the results of this new treatment will be lasting and the patients permanently cured. So far, however, they are doing well. They may have to take their daily drinks of radio-active sodium phosphate in water for the rest of their lives, as diabetics take insulin. At present the new treatment keeps them well, as x-ray treatments do. Leukemic patients become immune to x-ray treatments after a time, however, and are no longer helped by them. Professor Lawrence and his brother, Dr. John Lawrence, who is in charge of the medical work, hope that the radio-active material will continue to prove effective. The sodium phosphate is made radio-active in the giant atom-smashing cyclotron which has been developed by Professor Lawrence as a tool for physical studies of atoms.

The cyclotron is also being tried as a weapon against cancer. Patients with advanced cancers have been getting weekly treatments since September with powerful neutron rays from the cyclotron. These rays are more powerful than x-rays and have a different effect on tissues. The tumors have regressed, but, as with the leukemia patients, it is much too soon to know how lasting the results of the treatments will be.

White mice that had been given radio-active sodium phosphate showed their radio-active personalities to the physicians here by making a Geiger counter click when Professor Lawrence brought this instrument near their bodies. The Geiger counter is used to detect radio-activity of either natural radium or artificial radio-active substances. Cut flowers in a vase containing radio-active sodium phosphate in the water produced the same clicking on the Geiger counter.

This instrument, Professor Lawrence predicted, will be installed in every medical laboratory in the future. Physicians will use it to detect tagged atoms of phosphorus, common salt, iron and iodine in patients' bodies. The tagged atoms of radio-active materials will have previously been injected or given in a glass of water. The Geiger counter will show whether the substance spread through the body normally or not and thus will aid in diagnosis of diseases due to faulty assimilation or utilization of necessary chemicals such as iron, iodine, salt and the like.

A drink of radio-active salt water shows in the finger tips in about twenty minutes. This is the time it takes the radio-active salt to reach the finger tips via the blood. The method is already being used to test the rate of blood circulation in patients with heart ailments.—JANE STAFFORD.

SULFAPYRIDINE AND PNEUMONIA

ALMOST all deaths from pneumonia could now be prevented if pneumonia patients were given proper treatment on the first day they got sick, according to a report made by Dr. Perrin H. Long, of the Johns Hopkins School of Medicine, to members of the American College of Physicians meeting in New Orleans. The millennium of no more pneumonia deaths, which probably could be achieved by the new chemical remedy, sulfapyridine, will probably never be reached, Dr. Long said, because pneumonia patients do not see a doctor on the first day they are sick—in fact, usually not until they are desperately sick.

Sulfapyridine, however, has cut the pneumonia death rate at the Johns Hopkins Hospital by two thirds, Dr. Long reported. Only eight patients have died of pneumonia there since last July 1, when sulfapyridine treatment was started. Of these, four had pneumonia serum treatment alone, one had serum plus sulfapyridine, and three had sulfapyridine alone. The total number of pneumonia patients was 107.

Serum would not be necessary in the treatment of pneumonia, Dr. Long said, if sulfapyridine could be given the patient the first day of his illness. From the standpoint of cost alone this would be a tremendous advantage. It costs about twelve dollars to treat a case of pneumonia by sulfapyridine but the cost of serum treatment is at least seventy-five dollars. Serum is not always available, whereas sulfapyridine is both available and effective in all types of pneumonia.

Dr. Long and Professor E. K. Marshall, Jr., of the Johns Hopkins School of Medicine, have increased the efficiency of sulfapyridine by combining it with sodium. This makes it possible to inject the drug into the patient's vein, an advantage because in the first place many pneumonia patients are too sick to swallow medicines and in the second place it makes the drug act faster since it is now possible to get the most effective concentration of the drug in the blood within five minutes.

Sulfapyridine saves pneumonia-threatened lives apparently by slowing down the growth of the pneumonia germs. This gives the patient a chance to build up his own immunity or resistance to them and so to recover. After the drug has been given the temperature goes down but the patient still has pneumonia until his immunity reaches the point of overcoming the invading germs.

Sulfapyridine is also useful in treating infections with staphylococci, the germs which cause boils, among other things. It is too expensive to be used for boils but is being used in more serious staphylococcus infections. It is not, however, the final answer in these conditions. Something better must be found, Dr. Long said.

For streptococcus infections, the chemically related and

older sulfanilamide is more reliable than sulfapyridine because it is more readily absorbed. At least five million persons in the United States have been treated with sulfanilamide, Dr. Long estimates, since he first introduced it from abroad in the fall of 1936.—JANE STAFFORD.

NICOTINE ACID AND PELLAGRA

A FURTHER step toward eradication of pellagra, Dixie's hard-times disease, appears possible in the light of a report made by Dr. Tom Douglas Spies, of the University of Cincinnati and the Hillman Hospital, Birmingham, to the American College of Physicians.

New knowledge of how nicotinic acid cures pellagra by its effect on the body's chemistry was also reported by Dr. Spies. The chemical achieves its curative effect, at least in part, through its effect on one of the body's enzymes or ferments, codehydrogenase.

As an advance toward conquest of pellagra, it is now possible to detect the disease long before the rash and sore tongue appear, and to prevent these and other more serious symptoms of the ailment, such as the mental delusions. Physicians should suspect pellagra, Dr. Spies advises, in patients who for a long time have had "vague, grumbling complaints" without apparent cause, loss of weight, strength and appetite, and indigestion. Cross, fretful children who for years have been below normal in weight and height and whose school progress has been slow should also be suspected of being in the early stages of pellagra. Investigation of the patient's diet and certain chemical tests of blood and other fluids will clinch the diagnosis. Treatment with nicotinic acid in this early stage of the disease will quickly bring such patients back to good health.

Studying the diets of fifty pellagra patients, it was found that in almost every case the patient had not been getting enough calories, proteins, lime salts, iron and vitamins. In other words, they had not been getting enough meat, milk, eggs and fresh fruits and vegetables.

People living on such diets get not only pellagra but other ailments, such as the nerve disorder, beriberi. Nicotinic acid will cure the pellagra, but to cure the other conditions certain other chemicals, the new synthetic vitamin B and flavin, are needed. Since both these and nicotinic acid can be obtained from food, the importance is urged of a good diet for pellagra prevention. While the ailment is most common in poverty-stricken people, it also occurs in persons who follow an inadequate diet because of illness, chronic alcoholism or addiction to diet fads.—JANE STAFFORD.

THE ROLE OF VITAMIN A IN THE BODY

MAN'S nearest approach to a perfect vacuum is aiding science to learn more about vitamin A, the dietary element which helps human vision and aids in preventing body infections. This new feat was reported to the American Chemical Society meeting in Baltimore by Dr. Edward LeB. Gray, of the research laboratories of Distillation Products, Rochester, N. Y.

With the aid of special pumps in which molecules of oil "sweep out" air from the vacuum chamber, it has at last been possible to distill vitamin A_2, a rare form of the vitamin which has recently been found. Vitamin A_2 has been isolated from the livers and eye retinas of fresh-water fish where it appears to have the same rôle as ordinary vitamin A.

Vitamin A combines with protein in the retina of the human eye to form visual purple, an essential element in vision. Absence of vitamin A leads to so-called night blindness in which vision is impaired temporarily by the glare of bright lights.

A significant point in the new work is that vitamin A and vitamin A_2 distill at the same temperature, indicating that the two compounds must be very close to one another if not identical in size.

"When the complete structure of vitamin A_2 has been worked out," Dr. Gray indicated, "the biochemist will have two compounds of known structure playing the rôle of vitamin A in the body instead of one, and thus give a clue to the functional group responsible for its vitamin activity. This, in turn, will aid in shedding light upon the rôle of the vitamin in the living organism." As the picture now stands it appears that perhaps only a significant part of the large vitamin A molecule is needed to give its physiological effects.

Distillation at the extremely low pressure of one thousandth of a millimeter of mercury is necessary in the new research so that the vitamin A_2, which is extremely sensitive to heat, will not be decomposed by the heat before it is distilled.—ROBERT D. POTTER.

MILK AS A RAW MATERIAL FOR INDUSTRY

THE days when the farmer's milch cow could be considered solely as a food "factory" are no more. Through modern chemistry the modern cow has taken on added stature as a source of raw materials for industry. Milk, butter and cheese are still the main output but more and more hitherto waste, or low-valued, products of the dairy industry are finding wider uses.

The dairy industry is just beginning to find out how to dispose of the whey—at a profit. Specialists from the Department of Agriculture's Bureau of Dairy Industry told their colleagues at the meeting in Baltimore of the American Chemical Society how to do it.

Skim the cream off whole milk and you can use the fat to make butter. Coagulate the skimmed milk with acids and you can get the curds out of which casein is obtained. What you have left is the straw-colored liquid known as whey. Little used, before now, this whey contains nearly fifty per cent. of the solids of the milk. In terms of the national picture 420,000,000 pounds of milk solids are available annually. Of these solids, according to the report of the government chemist, A. Leviton, about seventy per cent. consists of valuable milk sugar. Another eight per cent. are proteins that coagulate on heating, and the balance consists of salts of milk. Present, too, are significant water-soluble vitamins, particularly vitamin G, known as riboflavin. With new methods of extraction employing alcohol, the yields of milk sugar have been markedly improved. Proteins are obtained in soluble form that differ from the ordinary insoluble proteins in the same sense that the albumin of fresh un-

cooked eggs differs from the coagulated albumin of boiled eggs.

Not only is the "mining" of whey for its chemical products being done more efficiently, but the whey itself is used in a variety of ways. Dr. Lee T. Smith and H. V. Claborn reported methods of treating the whey to produce a rubber-like substance known as polymethylacrylate. This material, looking quite like a kind of clear art-gum eraser product, is highly elastic, very tough and is not discolored by sunlight. Applied to fabrics, it renders them impervious to the passage of gases. One of its potential uses is for sealing clothing against war gases.

From the casein of milk chemists produce plastic materials which have been used for buttons, telephone handsets and steering wheels on automobiles. But the casein can be used, too, to produce fibers for weaving into beautiful fabrics closely simulating wool. Drs. Earle O. Whittier and Stephen Gould described their methods of making this synthetic wool from cow's milk. These scientists have obtained the first American "public service" patents for the development.

Synthetic wool was first developed in Italy where commercial production is now under way. Italy's motive has been the finding of a wool-substitute and thus avoiding the need for importing large amounts of natural wool. This war-scare motive has been an important factor in many chemical developments abroad.

The exhibit, "Fabrics of the Future," which Science Service is now sending on tour throughout the United States contains a woman's dress woven from a combination of this synthetic wool and natural wool. The casein in the dress cost only 50 cents. Drs. Whittier and Gould cited this exhibit in their report.

The free government patents on making synthetic wool improve on the Italian work in that they can be applied to casein obtained from other than cow's milk. In fact, the use of casein is only for its protein content and so synthetic "wool" has been made, experimentally, out of many other proteins. In the United States soybean protein has been used. In Germany and in Japan, the protein from fish has been turned into a synthetic wool-like fiber.—ROBERT D. POTTER.

NATURAL GAS AND HIGH EXPLOSIVES

AMERICA'S potential wartime needs of high explosives can now be made from natural gas, air and steam, it is announced by Professor Henry B. Hass, head of the department of chemistry at Purdue University, who presented the technical details of his discovery at the ninety-seventh American Chemical Society meeting at Baltimore.

The way to make two new explosives, nibglycerol trinitrate and nibglycol dinitrate, from these abundant and cheap raw materials is significant, for the new chemicals possess properties comparable with nitroglycerol, used for dynamite and military explosives. This research will give the nation potential freedom from dependence on glycerol, common basic material of many explosives used to-day. Glycerol is a comparatively minor product of the soap industry.

Development of explosives from natural gases is helpful to America, for ninety-eight per cent. of the world supply of such gas is concentrated within the continental United States. An insignificant fraction of this gas would furnish all the high explosives which could ever be used. The new explosives are as powerful as nitroglycerol and yet are only half as sensitive and can therefore be handled with greater safety.

Working with Professor Hass in the original experiments on nitration were H. J. Hibshman and E. H. Pierson, Purdue Research Foundation fellows.—ROBERT D. POTTER.

ITEMS

THE best gasoline mileage for motor cars is in the range of moderate speeds, around twenty-five miles an hour. This fact was reported at the southeastern meeting of the American Physical Society by Professor J. B. Derieux, of the North Carolina State College at Raleigh. In a speed range from five to 60 miles an hour, it was found, the maximum mileage was achieved at 25 miles an hour and an average of about 20 miles to the gallon was obtained. At five miles an hour, the mileage per gallon was about 14, while at 60 miles an hour, 12 miles to the gallon was recorded.

COPPER, passed through the skin by electric current, is being successfully used in treating fungous infections of the hands and feet by physicians at Yale University Medical School. Of 37 patients treated at Yale by means of electric current, 26 have been discharged as cured. Some of them had severe infections of long duration, one for as long as 25 years. The average number of treatments given was six. The patient sits with his feet immersed in enamel pans and with the hands in other basins. When the infection is on the feet, the hands are immersed in salt solution and the feet in 0.2 per cent. copper sulfate solution. For infections of the hands the relations are reversed. Dr. Howard W. Haggard, Dr. Maurice J. Strauss and Leon A. Greenberg describe the new treatment in a preliminary report in the *Journal* of the American Medical Association for April 1.

THE construction of new hospitals is proceeding at an unusually swift pace. At the same time existing hospitals have more idle beds than they had a year ago, the *Journal* of the American Medical Association states in its annual hospital number. For the first time since 1930 the number of registered hospitals has increased over the previous year, the journal survey shows. A year ago there were 6,128 registered hospitals. To-day there are 6,166. The growth of hospital facilities has outstripped the advance in population. Such increases in proportion to population can not be maintained indefinitely. During 1938 the net gain in registered hospital facilities was equal to a 101-bed hospital for each day of the year. In 1938, there were 9,421,075 patients admitted to registered hospitals. That means that one person in every 14 spent some time in the hospital. The average stay per patient in general hospitals was 12.5 days. More than a million babies, 1,026,771 to be exact, were born in hospitals during 1938.