SCIENCE NEWS

Science Service, Washington, D. C.

PAPERS READ BEFORE THE BOSTON MEETING OF THE FEDERATION OF AMERICAN SOCIETIES FOR EXPERIMENTAL BIOLOGY

BALDNESS, cataracts of the eyes, poor teeth and inability to father offspring all may result from lack of one single food chemical in the diet, tryptophane. Dr. Wilhelm Buschke, Dr. Anthony A. Albanese and Dr. Richard H. Follis, Jr., of the Johns Hopkins University, announced the results of their work on March 31 at the opening session of the Federation of American Societies for Experimental Biology. Tryptophane, the food chemical lack of which can bring on the four symptoms, is one of the ten essential amino acids which are building blocks of proteins. The proteins of cereals or grains in general contain considerably less tryptophane than proteins in animal foods such as meat, fish, poultry, eggs and milk. The discovery indicates the danger of relying entirely on cereals as source of protein, as might be done in a post-war world faced with grave shortages of other kinds of foods. The danger of one-sided diets containing inadequate sources of amino acids has long been suspected. Studies by other investigators have shown that laboratory rats can not manufacture the ten essential amino acids in sufficient amounts in their bodies to supply their needs for normal growth. It was assumed that man also required these protein building blocks in his food. These researches, however, show for the first time the full extent of the damage resulting from lack of one of these acids, tryptophane, and gives also for the first time concrete evidence that humans as well as laboratory rats require this amino acid.

Human need for another amino acid, arginine, suspected of being a paternity chemical, has previously been reported by Dr. Albanese and associates. The baldness, cataracts, malformation of tooth enamel and wasting of the male sex glands resulting from lack of tryptophane in the diet were demonstrated in paired feeding experiments with rats. But human volunteers who ate a diet lacking this chemical showed the effects of the deprivation through chemical tests. If they had continued as long on the diet as the rats did, they would probably also have grown bald. The tooth defects and the cataracts occurred only in young, growing rats on the tryptophane-lacking diet. The baldness and sex gland destruction occurred in both young and old rats. The baldness and the cataracts could be cured by adding tryptophane to the diet. Some of the changes resulting from lack of tryptophane also occur in vitamin A starvation. This may mean that without plenty of tryptophane, the body can not use vitamin A even if it is present in the diet.

Demerol, a new synthetic pain-killing drug that comes closest of any so far developed to being the long-sought safe substitute for the poppy's morphine, was described. Favorable results from its first U. S. trials on nearly 1,000 patients and laboratory animals were reported by Dr. David R. Climenko, of the Research Laboratory of the Winthrop Chemical Co.; Dr. Robert C. Batterman, New York University College of Medicine, and Dr. H. L. Andrews and Dr. C. K. Himmelsbach, of the U. S. Public Health Service's hospital for narcotic drug addicts at Lexington, Ky. Summing up the observations of these men, it appears that relief of pain requires larger doses of Demerol than of morphine. Making up for this is the greater safety of Demerol, which allows physicians to give much larger doses of it than of morphine. The pain-relieving effect starts within 15 or 20 minutes and lasts for as long as six hours. It is most dramatic in patients suffering from the excruciating pain caused by kidney stones and gallstones. Demerol, like morphine, is habit-forming but unlike morphine, it has almost no addiction property, that is, it does not cause physical craving for the drug to the extent that morphine does. Demerol was first developed in Germany but is now being made in the United States. It is not yet available except to research institutions, pending approval by the U. S. Food and Drug Administration of an application for its more general release. Even if it becomes available commercially, it will probably not be sold without a physician's prescription.

Heavy drinkers of whisky and other alcoholic beverages probably do not require extra amounts of vitamin B_1 to protect their nerves and keep them healthy. Experiments casting "considerable doubt" on the current theory that alcohol increases the body's need for this vitamin were reported by Dr. J. V. Lowry, Dr. W. H. Sebrell, Dr. F. S. Daft and Dr. L. L. Ashburn, of the U. S. National Institute of Health. In these experiments rats kept on the water wagon without exception developed the severe nervous disorder believed due to B_1 deficiency in alcoholism before their litter mates that were getting alcohol or whisky. The nervous disorder could be prevented and cured by the vitamin, regardless of whether the rats drank alcohol, water or whisky. These experiments give the first indication that alcohol does not require vitamin B_1 to help burn it in the body. They suggest that a person who sticks to a good diet could probably drink a quart of whisky daily without needing extra vitamin B_1 to burn the alcohol. If, however, he neglects his diet, as alcoholics probably do, and fails to eat enough foods containing vitamin B_1, he would develop the nervous disorder. The whisky or alcohol could be blamed for causing the change in diet but not for causing the sickness by depleting the body of the vitamin.

Germs may be at the root of the gray hair problem. This possibility appears in a report made by Dr. Gustav J. Martin, of the Warner Institute for Therapeutic Research, New York City. Dr. Martin is one of a group who last fall reported that lack of a vitamin-like chemical, para aminobenzoic acid, was the cause of gray hair and that doses of this chemical would remedy the condition. Dr. Martin's studies were on rats, while others applied the findings, apparently successfully, to humans with gray hair. Now Dr. Martin reports, after

further experiments with rats, that it is not PAB (para aminobenzoic acid) alone, but the ratio of this chemical to another vitamin chemical, pantothenic acid, that is the important factor deciding whether or not rats, and possibly humans, will turn gray. A ratio favoring PAB results in graying. The germs come into the picture because certain of these microbes, harmless ones that are normally present in the intestinal tract, are stimulated to grow by PAB. Probably, Dr. Martin explains, these germs destroy pantothenic acid, thus upsetting the ratio of this vitamin to PAB.

"X," signifying unknown, is still the only name that can be given to the anti-gray hair vitamin or food ingredient, according to a report from Dr. F. Peirce Dann, Dr. Ruth C. Moore and Dr. D. V. Frost, of the Abbott Laboratories, North Chicago, Ill. PAB had no effect on graying alone and slight, if any, supplementary effect with calcium pantothenate, in the case of rats. Giving all the known B vitamins including PAB did not prevent graying. But brewers' yeast and whole liver powder each prevented graying. So an unknown is again proposed as the anti-gray hair chemical in food.

PAB, demoted as anti-gray hair chemical, may turn out to be a vitamin promoting youthfulness and romance in a slightly different way, it appears from other experiments reported by Dr. G. J. Martin, Dr. S. Ansbacher and Dr. W. A. Wisansky, of the research laboratory of the American Home Products Corporation, at Richmond Hill, N. Y. Daily doses, in many cases, "seemed to stimulate appetite, to increase libido, and to improve certain asthmatic conditions." They believe this chemical may act to protect or spare certain of the gland chemicals of the body.

A link between the thyroid gland in the neck and acne, the pimply skin condition that is the bugbear of the late teens and early twenties, was announced by Dr. Broda Barnes, of the University of Denver. Treatment with thyroid gland extract is bringing improvement in severe cases of acne that were not helped by any other kind of treatment. It is too soon to be sure of the results, but they suggest that an underactive thyroid gland may be a factor in causing acne. Basal metabolism tests, which indicate whether or not the thyroid gland is producing enough of its hormone, were run on 85 college men and women with acne. In general, the worse the acne, the lower was the metabolic rate, indicating lack of thyroid hormone.

Brain workers apparently would be able to do more and perhaps better work, or at least could do their regular work with less fatigue, if they increased their daily ration of B vitamins above the amount required by the average healthy person. Those who perform physical work, however, need not expect any increase in muscular strength or endurance or any lessening of muscular fatigue through taking extra amounts of B vitamins. These are the conclusions of studies reported by Dr. Ernst Simonson, Dr. Albert Baer and Dr. Norbert Enzer, of Milwaukee. A large surplus of the vitamin B complex was given to twelve healthy persons and compared them with eleven people on an ordinary diet. The extra vitamin ration had no detectable effect on any type of muscular activity, neither endurance, recovery, speed, force nor fatigue, but it did prevent fatigue of the central nervous system, which includes the brain.

Somewhat disconcerting to the chemists at the meeting was the discovery announced by Dr. E. C. Kendall, of the Mayo Clinic. In their efforts to extract hormones from the adrenal gland cortex in a state of pristine purity, the chemists, it appears, have defeated the physician's goal of extracts that are effective in treating sick people. The activity of the gland extract itself is ten to twenty times that of the hormones that have been obtained in pure, crystalline form. In future, he advises, chemists must find a way not only to extract the gland material completely but also to safeguard the enhanced activity of the hormones as they occur in the natural state in the body.

Reports of a new sulfa drug, a possible diabetes remedy from a Puerto Rican plant, and the hazard of magnesium in certain industries and war wounds was reported in the closing sessions. The new sulfa drug is sulfapyrazine. It was introduced by Dr. George W. Raiziss, Dr. M. Severac and Dr. J. C. Moetsch, of the University of Pennsylvania and the Abbott Laboratories. It has the advantage of being rapidly absorbed when taken by mouth, and hence of quick action, tests on mice showed. In these animals it proved to be effective against two types of pneumonia, a streptococcus infection and a staphylococcus infection.

The possibility of a plant chemical becoming a diabetes remedy appeared in the report of Dr. Gilberto Rivera, of the Tropical School of Medicine, University of Puerto Rico. The plant is the balsam pear or "art pumpkin," known to Puerto Ricans as Planta Cundeamor and to American botanists as Mormordica Charantia. Chinese gardeners grow it around American cities under the name of la-kwa, and Chinese cooks have used it in stews for sick people. The Puerto Rican natives, however, actually used it to treat diabetes, and Dr. Rivera's scientific studies show that it does lower the blood sugar of both animals and human diabetics. Insulin, of course, is the standard remedy for diabetes, but both before and since its discovery, search for other diabetes remedies has been made. Dr. Rivera warns against use of the plant to treat human diabetics until further studies of its toxicity and possible value have been made.

Wounds from bomb fragments or aircraft fragments that contain magnesium may have special complications as a result of the body's reaction to magnesium splinters, according to Dr. Carl W. Walter and Dr. Reuben Z. Schulz, of Harvard Medical School. When this metal or its alloys get into tissues under the skin, it causes an injury scientifically termed a pneuma-granuloma, which might be roughly translated as a gas cancer or gas tumor. The metal becomes jacketed with fibrous tissue surrounded by spaces filled with gas under pressure. The injury expands slowly as gas accumulates, compressing adjacent tissues, just as a cancer or tumor increases in size and compresses neighboring tissues and organs. This gas tumor is also a hazard to workers in industries where magnesium may get into accidental wounds. In the case of both industrial and war wounds, the magnesium should

be removed immediately to avoid dangerous encroachment of the gas tumor on vital tissues.

Safer blood transfusions may result from studies reported by Dr. N. A. Masor, Dr. Harry Greengard, Dr. W. L. Voegtlin, Dr. J. P. Sandblom and Dr. A. C. Ivy, of Northwestern University Medical School. A relation between the kind of foods eaten by the donor and recipient and harmful reactions to blood transfusions was discovered in studies on dogs. Harmful reactions occurred most frequently when the recipient had been fasting, as many patients receiving transfusions must do because of their serious condition, and the blood donor had been fed before the transfusion a protein or carbohydrate-protein meal, as, for example, meat, or meat and potatoes or meat and bread. Harmful reactions in a fasting recipient occurred less frequently when the donor had been fed a meal of starches and sugars alone, or had also been fasted before giving blood. No harmful reactions occurred when both donor and recipient were fed before the transfusion or when the recipient was fasting and the donor was fed fat.

Uncle Sam may be missing a few hardy workers by putting the upper limit of the draft at 64 years, it appears from a study reported by Dr. F. A. Hellebrandt and Dr. Percy M. Dawson, of the University of Wisconsin Medical School. Dr. Dawson himself is one 68 years old who has lost surprisingly little ability to do hard muscular work and to recover therefrom. This is true even though, as he points out, maximum strength and endurance are reached at about thirty years of age and the ability to carry on sustained work is thought to dwindle during the later years of mature life. He and Dr. Hellebrandt compared his present ability to pedal a bicycle with his ability 27 years ago as a way of studying the effect of aging on fitness for muscular work. The bicycling in such experiments is done to the limit of effort and the amount of work done is measured. Dr. Dawson took part in such experiments in 1914, 1926, 1927 and 1929. His present performance is about 72 per cent. of his 1914 performance and about 80 per cent. of that at the age of fifty-three years. His optimum speed of pedalling had dropped 12 per cent. The maximum heart rate, systolic blood pressure and pulse pressure attained during exercise fell short of the peak values of 1914. Recovery from the acute effects of the effort was prompt and uneventful. Transitory abnormalities in heart rhythm occurred once. A mild post-exercise negative phase in blood pressure followed the severest ride. There was less resilience than earlier, extending the number of rest days required between rides. Staying power improved about 150 per cent. during the brief period of training.

Prediction that both man and his domestic animals are going to suffer from the present trend toward non-fatty diets was made by Dr. G. O. Burr, of the University of Minnesota. The latest discoveries show that fats do more than supply energy. They contain substances, the fatty acids, needed for the health of many vital parts of the body such as the kidneys, reproductive organs and skin. These fatty acids serve as essential building stones of the body. One of them, linoleic acid, which gets its name from linseed oil, is especially important to the health of the skin. Physicians have already applied this discovery with success in treatment of some skin disorders. Babies with intractable eczema and grown-ups who have "never had a clear skin since they could remember" have been cured of their skin trouble by doses of linseed oil or by diets that supply plenty of this fatty acid through butter, lard and salad oils. This treatment will not cure every case of skin trouble because not all cases are necessarily due to lack of linoleic acid in the diet. He thinks, however, that the average diet contains too much starchy and sweet food and not enough fat of the kind that supplies linoleic acid. The skin effects of lack of this acid, he said, become especially noticeable when humidity is low, as in heated houses, or when some of the vitamin B complex is also missing or scanty in the diet. Common diets contain only about 5 per cent. of their calories in fat. This is much too low.

Excessive acidity of the nerves may be responsible for a host of serious ailments, including the dangerous condition that overcomes high-altitude flyers and mountain climbers, was pointed out by Dr. Robert Gesell, of the University of Michigan. The acid nerve condition which may be responsible for pilot failure in high-altitude flying without oxygen can not be counteracted by the soda bicarbonate or other alkaline powders which the layman takes for his so-called acid stomach. Excessive alkalinity of the nerves may cause just as much trouble as excessive acidity, but it can not be corrected by taking lemon juice. Neither acids nor alkalies that people could take into their stomachs would change the acid or alkaline state of the nerves. To change nerve acidity requires injections directly into the veins of the very powerful alkalizing or acidifying chemicals. The degree of acidity or alkalinity of nerves that makes the difference between health and serious illness is actually rather small. But the shift from just the proper balance to excessive acidity or alkalinity of the nerves may influence all body processes, including breathing, heart action and digestion, Dr. Gesell believes. When the nerves are made too acid, he discovered, they discharge excessive quantities of the chemical, acetylcholine. It is this chemical, many scientists believe, which causes a muscle to move in response to a nerve impulse. Sometimes muscles go on moving along after the nerve impulse has ceased. A familiar example is the trembling that follows prolonged or excessive physical exertion. Epileptic fits are attributed by some scientists to the same mechanism, which is called the after discharge. The theory is that the nerves continue to release acetylcholine which, as it piles up in the muscles, keeps them contracting. Excess acid, Dr. Gesell's experiments show, is responsible for this condition. Why the nerves become too acid or too alkaline is not entirely known. Too little oxygen and too much carbon dioxide apparently can cause acidity, and the reverse can cause alkalinity. Increasing nerve alkalinity, Dr. Gesell found, facilitates the destruction of the nerve chemical, acetylcholine. This might lead to paralysis. A kind of convulsion accompanied by muscle cramps, called tetany, and coma or unconsciousness, are other conditions which may be explained on the basis of acid or alkaline nerves, Dr. Gesell believes. Working with him on the experiments were Professor Charles R. Brassfield, Elwood T. Hansen and Arnold Mason, also of the University of Michigan.