SCIENCE NEWS

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THE AMERICAN CHEMICAL SOCIETY

By Dr. Edwin E. Slosson

Director of Science Service

The largest association of scientific investigators in the world, the American Chemical Society, opened its general meetings at Swampscott on September 11 for the discussion of reports of progress in the study of questions of practical importance to every person in the country. Such problems as the promotion of the prosperity of the farmer, the proper employment of water power, the utilization of oil, the production of fertilizers, the expansion of foreign commerce, the development of manufactures, the improvement of health, the maintenance of the food supply and the defense of the economic independence of the United States in such vital matters as rubber, nitrates, paper, clothing, medicines and dyestuffs are more likely to be settled by the researches of scientific societies like this than by political platforms or public discussions.

For instance, cellulose now provides both literature and lingerie. If then the Division of Cellulose Chemistry can show how to get this material from straw, corn-stalks and sawdust, it will convert one of our wastes into wealth. So, too, if the chemist can convert the waste nitrogen of the air into ammonia and nitrates cheaper than can be done at Muscle Shoals it will remove another vexed question from the political arena. This meeting of the American Chemical Society at Swampscott marked the end of the first century of synthetic chemistry and the opening of a new epoch which seems likely to effect even more startling changes in business and daily life by the substitution of artificial for natural products. Three addresses at the opening session on Tuesday morning were devoted to the commemoration of a discovery made by a young German chemist in 1828 and to the consideration of its remarkable results. The speakers were Professor W. H. Warren, of Clark University; Arthur D. Little, of Boston, and Jocelyn Thorpe, of the Imperial College of Science and Technology, London. The discoverer was Friedrich Wöhler, of the University of Göttingen, then only twenty-eight years old. What he made was of no value to anybody for it was a waste product of all animals, urea. But the fact that he was able to make it in the laboratory from mineral materials overthrew the doctrine hitherto held that the chemist could never expect to compete with nature in the production of compounds of carbon. Urea is a white, odorless, crystalline substance, looking like salt or sugar and tasting somewhat like niter. It is now made by the ton from coal, water and air, and is extensively employed as a plant food in Germany on fields and pastures where it is said to double the yield of crops or milk. In the hundred years since Wöhler showed that the way was not barred to the manufacture of the products of animal and vegetable life, the chemist has made hundreds of thousands of compounds of carbon, such as dyes and drugs, foods and flavors, some of them the same as found in nature, some of them better for our purposes. A glance at the program of the meetings of the American Chemical Society shows that new achievements in this field of synthetic chemistry are being made. On Tuesday afternoon A. Lincoln Marshall, of the General Electric, and Arthur Knudson, of Albany Medical College, spoke on the formation of Vitamin D by artificial light. This would have sounded like an absurdity a few years ago, for Vitamin D was given to children to prevent rickets in the form of cod-liver oil. But now we know the mother substance of this vitamin and how to make it active by light waves of a certain sort. Another new field that the chemist is beginning to invade is that of disease. On Wednesday Dr. Ellice McDonald, of the University of Pennsylvania, talked on the chemistry of cancer, and Dr. Arthur Stull, of the New York State Board of Health, on the chemistry of pneumonia. Professor R. J. Anderson, of Yale, has been analyzing the wax coating with which the tuberculosis germ protects itself against our efforts to destroy it.

How coal and petroleum and natural gas may serve as sources of alcohols was one of the practical questions discussed at the meeting. This does not imply that the chemists disclosed any simpler or cheaper method for the manufacture of that alcohol which is prohibited for sale as a beverage by the Volstead Act for they were concerned with other and more useful members of the numerous alcohol family, such as those used as solvents in the lacquers which have recently risen in popularity. In 1927 about twenty-five million gallons of these lacquers were manufactured in this country. This is more than ten times the amount produced five years before. They have largely replaced paint and varnish for finishing automobiles and are rapidly invading other fields. They bear different trade names but consist essentially of dissolved cellulose, made by treating cotton or woody stuff with nitric acid and then dissolving it in various alcoholic and ethereal liquids. The preparation of the necessary solvents by the distillation of wood and the fermentation of corn has promoted new industries, but these are now threatened by the possibility of making them cheaper from fossil fuel. Arthur D. Little, of Cambridge, Mass., announced the results of the new method of breaking up petroleum as carried on a large scale in the plant at Tiverton, R. I. One barrel of gas oil gives 46 per cent. of motor fuel, five gallons of the higher alcohols and 800 cubic feet of useful gas, of which a fourth consisted of ethylene. This gas has recently been found to be a valuable anesthetic and also is extensively used for ripening fruit. "One cubic foot of ethylene a day introduced into a room of 5,000 cubic feet capacity will bring oranges to that golden color which nature re-

quires weeks to develop. Lemons picked grass green and carefully cured with ethylene will taste better, ship better and outsell lemons ripened on the tree. Tomatoes, celery, bananas and other fruits lend themselves to similar treatment to advantage, and we may even look forward to a time when melons will look more like melons and taste less like squash.'' Ethylene may also prove an aid to agriculture in another way, for certain of its derivatives are found to have the useful knack of speeding up plant growth. Seed potatoes so treated sprout nearly two months earlier than otherwise, and in many localities this makes it possible to grow two crops a year instead of one. Dr. Little hinted at a still more revolutionary change in agriculture in the possible replacement of beef cattle by the yeast plant. ''Whereas it requires about 100 pounds of foodstuffs to produce three pounds of beef and three acres of land to support a cow, thousands of pounds of solid yeast protein can be developed and separated in a few hours in a very limited space from molasses and many other wastes containing fermentable sugars.'' That the yeast plant may be given more duties to perform in the near future than making bread and beer is evident from other papers read before the American Chemical Society. Dr. Charles E. Bills told of the preparation from yeast of a white crystalline compound called ''ergosterol,'' which is one of the new hard words that the public will have to learn some time although it is so far unfamiliar even to chemists and they are not yet agreed on its pronunciation. The British chemists at present accent it on the third syllable and the American on the second. But the newcomer is important, whatever they call it, for it can be converted by the rays of the sun or mercury arc lamp into Vitamin D, which keeps babies from growing up with bow legs and poor teeth. This is the first of the vitamins to be made artificially and is so pure and potent that the addition of one part in a billion of the food will prevent rickets.

INTOXICATION by water was the topic discussed by Dr. Oliver Kamm, of Detroit. Whether water is a harmless beverage depends upon the amount imbibed and the cellular constitution of the imbiber. The four glasses a day recommended by one of the insurance companies which has taken on the task of protecting the people's health may be too heavy drinking for a few individuals, while others may drink several gallons of water a day without slaking their abnormal thirst. Dr. Kamm has found that the amount of water demanded is dependent upon the activity of the posterior portion of the pituitary gland at the base of the brain. This little organ secretes two kinds of hormones, or regulators of the human system, so much alike that they have been called ''the pituitary twins,'' but have recently been separated and are now employed in medicine for different purposes. They are distinguished as A and B, or on account of the traditional fondness of scientists for Greek, as alpha and beta. The beta secretion regulates the water supply. The portly person who persists in putting on weight in spite of cutting down his diet and drink may be suffering from an excessively active pituitary gland or from the undue sensitivity of his tissues to the secretion. He is called ''fat'' by his friends or his enemies, but he may be merely water-logged. On the other hand, the scrawny man, who remains lean however much food and water he takes, may have the opposite defect of pituitary action and may be suffering from desiccation. This same beta hormone aids the frog in changing his skin color to suit his surroundings as a kind of camouflage. A frog in his light-colored costume turns dark on being treated with a minute dose of the hormone, because this expands the black cells in his skin. Dr. Kamm suggests that this secretion may serve to save life in the case of extensive body burns since the danger here is from the undue drying of the tissues. The menace to public health from the common use of arsenic in spraying fruit trees, vegetables and tobacco to ward off insect enemies was emphasized by Dr. C. N. Myers, of Brooklyn. Fruit is often insufficiently washed and tobacco leaves are impossible to wash free of the poison. Celery and lettuce are sometimes dangerous because inadequately cleansed. A single apple has been found to carry a full medicinal dose. Since arsenic accumulates in the system even minute doses may become injurious if frequently repeated. How to make mayonnaise to suit lean ladies was one of the questions discussed in the food section of the American Chemical Society. It seems that a new sort of salad dressing has been invented which contains only 30 calories of fattening food per helping instead of 120 as in the old-fashioned recipe. Other questions considered in this food industries symposium were how to get vitamins into margarine and breakfast foods, how to get holes of the proper size in Swiss cheese, how to make the advertiser of breakfast foods stick to the truth as the chemist sees it, and how to utilize the millions of pounds of skim milk and whey now wasted every year. Dr. G. E. Holm, of the U. S. Department of Agriculture, called attention to the saving effected by the new method of transportation of milk in bulk by glass-lined tank cars, but pointed out that shipping dry milk would be still more economical, for it never pays to transport water.

A NEW and apparently profitable employment for natural gas was pointed out by T. E. Layng and R. Soukup. Experiments being carried out at the State University of Illinois have shown that methane can be easily and quickly and presumably cheaply converted into formaldehyde. Now the raw material, methane, is the chief constituent of natural gas, which runs to waste in some parts of our country as we may see by the flaring torches burning all night in localities needing no illumination. And the product, formaldehyde, is familiar to all of us under the name of ''formalin,'' since it is in common use as a disinfectant. It is equally common, although not so familiar, as one of the two constituents of bakelite used in radio receivers, phonograph records and automobiles. The other component of this synthetic plastic is the well-known disinfectant carbolic acid, obtained from coal-tar. The Illinois investigators get as high as 30 per cent. of the methane transformed by a single passage of the gas, together with oxygen, through

a small glass tube heated to a temperature of 690 degrees centigrade and without the need of the high pressure that previous investigators have been obliged to employ. The secret of their success is the use as the catalyst, or combining agent, of a small amount of one of the oxides of nitrogen, the red fumes familiar to every beginner in chemistry. Other compounds produced from natural gas are formic acid and methanol and it seems feasible to direct the process so as to form these and other useful products in predominant proportions. Methanol, commonly called "wood alcohol," is employed as a denaturant to render alcohol unfit to drink and some of our citizens have found to their sorrow that it is not the same thing as grain alcohol. It used to be made by the distillation of wood, but a few years ago German chemists found out a way of making it from coal and have since been exporting it to America. But if it can be made still cheaper from natural gas we may regain the native industry. The chemical industries suffer from the rapid progress of chemical science. At the nitrogen symposium almost all the speakers took occasion to point out that the plants built during the war for the fixation of atmospheric nitrogen for explosives, like that at Muscle Shoals, were obsolete and incapable of competing with processes invented since. In the early and antiquated methods, meaning those of ten years ago, the chief requisite was cheap power. Now cheap hydrogen is more sought. Jasper E. Crane, of the plant at Lazote, West Virginia, says: "It is natural that so many nations of the world now aim to become self-contained with respect to nitrogen; the instincts of self-preservation both as regards self-defense and food supply prompt that desire. Yet this is bringing into being nitrogen projects that are economically unsound. For instance a plant which has enough to supply only the military nitrogen requirements of a country will be too small to work economically and to lend any contribution to the needs of agriculture. To bolster up such a project by governmental subsidy wastes public funds and prejudices private enterprise." H. R. Bates, of International Agricultural Corporation, reported that the world's consumption of inorganic nitrogen for the year ending June 30, 1928, was 1,600,000 metric tons, more than twice what was used in 1913. Of this output nearly a million tons are now extracted from the air factories. The rest is about evenly divided between the nitrogen obtained from the nitrate beds of Chile and that coming as a by-product of coke ovens. It is a curious situation, and fortunate for us, that there are three independent sources in competition to supply the soldier and the farmer and family refrigerator with the nitrogen they need—a mineral deposit, a continuous industry and the fixed nitrogen factory that can be expanded at will.

ITEMS

THE advisability of a general X-ray chest survey of U. S. Army recruits was discussed by Dr. Charles L. Maxwell, of Washington, D. C., at the meeting of the American Roentgen Ray Society at Kansas City on September 28. The discussion was based on an analysis of the latest fifty cases of pulmonary tuberculosis admitted to Fitzsimons General Hospital, Denver, in recruits of the U. S. Army with less than one year's service at the time diagnoses of tuberculosis were made. At the same session Dr. Ralph A. Kinsella, of St. Louis, outlined a plan for having X-ray pictures made of the chests of all patients admitted to the medical service of hospitals. The cost of hospital and patient, objections to the plan and beneficial results, such as discovering unsuspected cases of tuberculosis, were discussed by Dr. Kinsella and Dr. L. R. Sante, of St. Louis.

X-RAYS that are helping surgeon and physician to-day may tomorrow be helping psychiatrist and judge, prophesied Dr. M. J. Hubney, of Chicago, at the meeting of the American Roentgen Ray Society. The mental twist or aberration that makes a man behave in such a way that we call him insane or criminal may be due to abnormal structure or development of his brain. The X-ray has a big future in helping to detect these abnormal anatomical conditions and to connect them with abnormal functioning and unsocial behavior. Treatment of the insane and punishment of criminals will be much more effective when based on accurate knowledge of the physiological causes of crime or insanity.

A MOVING picture of living tissues, which shows just what happens to the cells of the body and to cancer cells when radium is applied, was the feature at the meeting of the American Roentgen Ray Society. The film, shown by Dr. A. H. Pirie, of Montreal, president of the society, was made by Dr. H. G. Canti, of London. In addition, films from the International Radiological Congress, at Stockholm, taken by Dr. T. Leucutia, of Detroit, were shown.

THE asphalt pits at the Rancho la Brea at Los Angeles, once filled with the skeletons of a score of species of mammals long since extinct, were for thousands of years constantly a slightly mobile and shifting mass. Huge bubbles of gas, slowly working their way upward through the mass of bones, tar, sand, dirt and trash, caused slight, discontinuous movements which by the contact of bone on bone or bone on teeth, produced great changes in the skeletal parts which is known to museum workers as "pit wear." Nowhere else in the world has such a phenomenon been known. Large, strong limb bones have been cut smoothly in two parts; teeth are curiously worn; skulls queerly scratched and abraded and thousands of skeletal parts worn into curious forms.

THE skeleton of a 5,000-year-old Greenland whale has been found at Kistinge, Sweden, by workmen digging a ditch near the seashore. A jaw-bone, measuring about 13 feet in length, has already been unearthed. On account of its size, it was first taken by the workmen to be a part of the hull of an ancient vessel. The bone has been examined by archeologists, who estimate the whale to have lived at the end of the ice age, about 5,000 years ago.