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CHEMICAL WORK REPORTED AT LOS ANGELES

THE process of imprisoning nitrogen in solid compounds from air by means of the electric arc is made possible in the state of Washington through the use of cheap electrical power, according to Professor H. K. Benson and W. L. Beuschlein, of the University of Washington, who spoke before the meeting of the American Chemical Society at Los Angeles on August 4. Ninety-four per cent. of all the electrical power in Washington state comes from water power as compared with thirty-four per cent. for the entire United States. Municipally-owned plants in Tacoma and Seattle are connected with the highly developed privately-owned plants in other parts of the state and are organized to dispose of surplus and seasonal current. The only arc plant in America for fixing nitrogen is in Washington and has recently enlarged its capacity for supplying the American demand for sodium nitrite. The yield is about two ounces of nitric acid per kilowatt hour. The process consists of oxidizing the nitrogen in the air by means of powerful electric arcs, which is then absorbed by sodium hydroxide forming nearly pure sodium nitrite and water. When the water is evaporated, the nitrite is ready for shipment.

Another process for permanently connecting the nitrogen of the air with something solid on earth is that of splitting water by means of electricity into oxygen and hydrogen. Air, which is four fifths nitrogen, is then added to this mixture, the oxygen removed and the mixture purified. Then at the high pressure of 300 atmospheres, and at a low temperature, the mixture of hydrogen and nitrogen unite as ammonia, each nitrogen atom taking unto itself three little atoms of hydrogen, in the presence of a catalytic agent, a sort of chemical parson.

A thousand years' supply of potash for the American farmer, independence in the future from European supplies and the establishment of a new great industry in the United States are all possible as a result of a new process for making potassium sulphate from the great quantities of greensand found in New Jersey, Delaware and Maryland, according to a report to the American Chemical Society by Dr. J. W. Turrentine, C. W. Whittaker and E. J. Fox, soil chemists of the U. S. Bureau of Soils. The process has been made economically possible by the manufacture of valuable materials such as alum, alumina, ochers and glaucosil, a new earthy absorbent, as by-products. The new process is being demonstrated in the laboratories of the Electro Company at Odessa, Delaware. The method consists in extracting the raw material with sulphuric acid. The greensand deposits, which are practically at the surface, can be worked with steam shovels, and Dr. Turrentine said that they are ideally located with respect to water or rail transportation, labor supplies and markets.

That vitamin A, found in butter, cod liver oil and many other substances, may increase the span of life, was shown by experiments on rats, reported by J. A. Hansbrough, of the University of Florida. Rats that were fed on distilled water and white corn alone, which is known to be unsuitable for normal growth and health and lacking in vitamin A, amino acids, and a number of necessary mineral substances, lived only an average of 60 days. When the missing salts were added to the diet, rats lived an average of 68 days. When casein was added supplying the missing amino acids, rats survived 87 days, but when butter was added to the diet of plain white corn, the rats began to live on forever, at least as far as the experimenters have been able to determine, for they are still alive and healthy at the end of 223 days.

Examination of more than a thousand samples of distilled liquors on sale in Massachusetts showed that more than nine per cent. contained poisonous copper salts in varying amounts. These results were announced by Dr. Hermann C. Lythgoe, director of the Massachusetts Department of Public Health, and his collaborators, to the society. The experimenters studied the corrosive power of various kinds of fermented liquors distilled through a copper coil.

Making motor alcohol from molasses and the juice of the sugar palm is now only a matter of cost because technical difficulties in the manufacture as well as in the use of the fuel by standard automobile engines have been solved, according to J. P. Foster, chief chemist of the Maui Agricultural Company's sugar factory in Hawaii. The advantages of this new motor fuel are said to be easy starting, elimination of knocking and freedom from carbon troubles. The alcohol is denatured by the use of ammonia, pyridine or aniline which also neutralizes the acidity of the fuel and the substances left over after burning.

RESEARCH IN CANCER

A DEFINITE poisonous principle in cancers and tumors, long suspected, but until now undemonstrated, has been shown to exist, according to the claims of three German investigators, Drs. R. Syderhelm and W. Lampe, who worked together, and Dr. V. E. Merteus, who conducted his investigations independently.

Drs. Syderhelm and Lampe made alcoholic extracts of cancerous tissue, dissolved the precipitate they obtained in salt solution and injected mice with it. The extract proved to be very poisonous to the mice, but only when the operation of extraction was carried on at a comparatively low temperature. At ordinary room temperatures no result was obtained. They conclude that the poisonous principle is destroyed at ordinary temperatures by an autolytic enzyme or self-digestive ferment that comes out in the extract along with the toxin.

Dr. Merteus made an extract from tumorous tissue with weak alcoholic solution, and found that the white powder left behind upon evaporation was poisonous to mice and guinea pigs.

Another German scientist, Dr. A. Werechinski, has obtained results that seem to confirm the view that cancerous and tumorous growths are similar to embryonic tissue, in that they are simply masses of rapidly growing cells; but that they have "run wild" and escaped from the controls of normal growth. Dr. Werechinski injected finely minced embryonic kidney and adrenal tissue under the skin of a guinea pig, which subsequently developed characteristic tumorous growths in two different parts of its body.

On the heels of the discovery of the antagonism between malaria and paresis which has made it possible to treat the latter disease by inoculating the patient with the former, comes a claim by a Russo-German physician, Dr. A. Braunstein, that he has discovered a similar antagonism between two other diseases, cancer and diabetes.

Recent researches in Germany have shown that cancer cells possess an abnormal appetite for sugar. One worker has shown that in thirteen hours a certain type of cancerous tissue can consume its own dry weight in sugar. Dr. Braunstein, who has been working on the problem for a dozen years, states that in his clinical experience he has noticed three outstanding facts regarding the mutual influence of diabetes and cancer. First, when a diabetic patient becomes afflicted with cancer the dangerous concentration of sugar in his blood and other body fluids falls off notably. Second, the patient becomes much more tolerant toward sugar and starch-containing foods. Finally, if the cancer is removed by surgical operation, the sugar content rises again.

One of the discoverers of the cancer germ, J. E. Barnard, F.R.S., will talk before the meetings of the British Association for the Advancement of Science to be held at Southampton from August 25 to September 2. Mr. Barnard's title is announced as "The observation of the infinitesimally small" and he will tell of his perfection of the ultra-violet microscope with which he assisted Dr. William E. Gye in seeing for the first time the minute organism or virus that is credited with causing cancer in chickens.

THE MECHANICS OF WALKING

FACTS and figures about leverage, stresses and distribution of weight in the human foot are to be sought by means of specially designed instruments at Yale University.

For several hundred thousand years men have been operating that remarkable mechanical device—the human foot—without knowing exactly how the thing worked or what to do when the mechanism failed. X-rays and studies of anatomy have helped to show the complex structure of the walking apparatus, but experts still differ in their interpretation of how the bones and muscles and tendons are coordinated.

Dr. Dudley J. Morton, instructor in surgery at Yale, who is in charge of the foot investigation, says that results of the army examinations during the recent war clearly show the practical value of the proposed research. The usual standard for determining the foot efficiency of the soldiers was the condition of the longitudinal arch.

"This method," he says, "led to the rejection of many applicants and drafted men whose feet presented low arches, but who had never experienced discomfort even under strenuous activity, because their body weight was properly distributed through their low-arched feet. On the other hand, many thousands of accepted recruits who possessed well-developed arches were soon assigned to 'development camps' because of foot trouble."

These facts testify to the unreliability of the height of the arch as a standard for determining the potential strength and integrity of the feet. The proficiency of the foot depends essentially upon the ratio of weight distribution to the chief bearing points of the feet.

Dr. Morton aims to estimate by mechanical means what the normal ratio of weight distribution is, that is, how the weight is distributed over the different sections of the foot, and how the ratio varies as the foot and other parts of the body change their position. He points out that he hopes "to devise, if possible, a practical method of foot examination which will eliminate the personal element on the part of the examiner and establish a uniform and accurate standard for foot examination both within the profession and for industrial and other purposes." The investigation is expected to provide a working ground for later study and progress in the treatment of foot disorders.

PSYCHOLOGICAL TESTS OF MOTORMEN

SPECIAL laboratory tests by which it may be possible to pick out the man who has the makings of a safe and efficient street-car pilot are being devised by Dr. Morris S. Viteles, of the University of Pennsylvania.

A man's rating on an intelligence test does not always indicate whether he is likely to lose his head in emergencies, or to run his car badly. This was shown by giving such tests to motormen in regular employment and comparing the results with the men's records in service and with the opinions of their supervisors.

Dr. Viteles then worked out a motorman selection test by which signals are given on a piece of mechanical apparatus and the prospective motorman responds with the same muscles that would be used in operating a trolley car. This apparatus measures the safety factors, such as a man's capacity to learn, his ability to keep his attention steadily on his job, and to act quickly in emergencies so as to avoid accidents. To test an applicant's general ability and courtesy, the psychologist devised a set of questions such as: "If an intoxicated man was annoying the passengers in your car would you: (1) Put him off the car? (2) Pay no attention to him? (3) Turn him over to the nearest officer? (4) Report to the train dispatcher?"

The problem of the alert and capable motorman is also being studied by use of elaborate testing machines in a new laboratory in Paris. A feature of the French laboratory is a realistic reproduction of a street car, in which the motorman's reaction speed and control are put to the test.

EXPEDITION TO ARMAGEDDON

ARMAGEDDON, the famous place of history, mystery and prophecy, is to yield its buried secrets to an American expedition backed by John D. Rockefeller, Jr. Plans are being made at the Oriental Museum of the University

of Chicago by Professor James H. Breasted for excavations on a large scale, to begin in the near future. Over four hundred workmen will be employed, in addition to the regular staff of scientific experts. Professors D. F. Higgins, of the University of Chicago, and C. S. Fisher, formerly of the University of Pennsylvania, expect to leave for Palestine about September 1 to make preliminary surveys of the ground and select suitable camp sites.

Armageddon, where, according to Scripture, the last of the world's great wars will be decided, is a mountain district, a continuation to the southward of the Carmel highland, lying in central Palestine, just across the great plain of Esdraelon from the holy city of Nazareth. The town of Megiddo, from which the region takes its name, commands a pass that leads to the plain of Sharon on the seacoast, and has therefore been the scene of much fighting in ancient times between the great kingdoms of the Euphrates Valley to the north and Egypt to the south, as well as the tribal battles of the Israelites with their neighbors. The part that Israel took in this fighting is recorded in two places in the Old Testament.

The first of these is in the song of Deborah and Barak, after the discomfiture of their enemies: "The kings came and fought, then fought the kings of Canaan in Taanach by the waters of Megiddo." (Judges 5: 19.) This triumph of the Israelitish champions (one of them a woman) over Sisera, leader of the army of their oppressors, is the record of a small and local war. In the second conflict recorded, Israel was an ally of Assyria against Egypt, and its king, Josiah, sacrificed his life at Armageddon in the effort to turn back the Egyptian invader: "In his days Pharaoh Nechoh, king of Egypt, went up against the king of Assyria to the river Euphrates; and king Josiah went against him; and he slew him at Megiddo, when he had seen him. And his servants carried him in a chariot dead from Megiddo, and brought him to Jerusalem, and buried him in his own sepulcher. And the people of the land took Jehoahaz, the son of Josiah, and anointed him and made him king in his father's stead." (II Kings, 23: 29, 30.)

With this long tradition of bloody fighting, it is not to be wondered at that the terrible apocalyptical visions of final battle, slaughter and dissolution at the end of the world should have been localized by the seer of revelation at Armageddon.

How old the town of Megiddo is, no one knows, but archeologists agree that it is older than history; or rather that the series of cities on the same site, one built over the ruins of the other, present such a long succession. It will be the purpose of the present expedition to gather data to illuminate this point, and with it to gain much new light on the ancient civilizations that met and battled there.

The expedition has selected, as the site of its first excavations, the scene of the most recent of the many battles of Armageddon: a ridge which lies about ten miles from the city of Nazareth, where the British, under General Allenby, met and defeated the Turks during the great war.

ITEMS

RECENTLY published statements claiming an appalling prevalence of disease among the Indians are declared by Dr. Hewett to be misleading. A recent survey shows that venereal disease is only about as common among the Indians as among their white neighbors, and if compared with the colored population of the South the Indians are much the cleaner race. While trachoma is considered by Dr. Hewett to be the most serious disease among the Indians, he declared statements that "thousands of Indians are going blind from trachoma" are exaggerations. Much trachoma, mostly in the curable stage, has been discovered among the Indians, and government physicians are now engaged in an active campaign to wipe it out.

The question of titles to Pueblo lands is being adjusted by a lands board established by the congress, Dr. Hewett said, in urging that appeals for money to bring in more lawyers should be ignored by those who have the interests of the Pueblos at heart.

"With the government's present Indian policy, liberal congressional appropriations and many friendly societies and individuals, the future of the Pueblo Indians is fairly well assured," Dr. Hewett declared. "There is, however, always danger of 'too much white man's medicine.' It is what he does for himself that makes for his future character and progress."

THE United States Bureau of Fisheries has answered the call of fishermen to do something about the irregular habits of the mackerel, one of the most highly-prized fish in American waters, and it is now initiating plans whereby the mystifying movements of this species can be traced. In some years the fishermen on the North Atlantic coast haul in many tons and in others there are hardly any of the fish. Certain localities that are known to be thickly populated by mackerel are suddenly deserted for years. The fish spoil an apparent regular and seasonal migration by bobbing up unexpectedly at both ends of their range at the same time or by appearing simultaneously at a number of places along the coast. O. E. Setto, assistant in charge of the Division of Fishery Industry, has been slated to determine the line of investigation and is now at Woods Hole, Mass, where a marine biological station is located.

VITAMIN "C" is present in concentrated orange juice as well as in fresh, according to the results of experiments by Dr. Harold Goss. The efficacy of the citrus fruits as antiscorbutic agents has long been recognized, for even before any one knew anything about vitamins British sailing ships earned the name "lime-juicers" by carrying quantities of lemons for the prevention of scurvy among the crew on their long voyages. In modern times, the question whether concentrated orange juice was as good as fresh for this purpose has developed considerable importance in the California orange belt. Dr. Goss's conclusions state that desiccated orange juice as well as concentrated juice possesses high antiscorbutic value, and that lemon juice ranks with orange juice in this respect.