SCIENCE NEWS

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RESEARCH ON COAL

THE elemental independence of modern man and his freedom from the accidental limitations of nature's distribution of natural resources under, on and above the surface of the earth was demonstrated at the Second International Conference on Bituminous Coal held under the guidance of the Carnegie Institute of Technology.

Oil from coal, coal from oil, coal from wood, edible fats from coal, rubber from coal, burnable gas from water, wood alcohol from coal, lubricants from coal, soap from coal, were a few of the possibilities, many of them practical commercial realities, that the coal conference reports added to the more familiar chemical processes of modern industry which now derive perfumes more fragrant than flowers, colors more varied than the rainbow, coke more useful than raw coal, gas more calorific than natural gas and a multitude of other every-day utilities from coal, wood, oil, air and water.

So rapidly is science discovering the secrets of the raw natural materials and their elements that these coal conferences might well be broadened into CHON conferences. Why not a synthetic name for the congresses that contribute so much new knowledge to the present era of the industrial transformations based on chemistry? The chemical symbol, C, for carbon contained in coal, wood and oil, H for hydrogen in hydrocarbons and water as well, O for oxygen most prevalent in the air, and N for nitrogen, four fifths of air, which is present in all living things and one of the principal constituents of fertilizer. These four chemical elements are the essentials of the vast fuel, coal, oil, wood, organic chemical, agricultural and food industries of the world as well as all forms of life. They exist the whole world over in some form or other. Every country has air and water, certain countries like the United States are blessed with bountiful supplies of easily available C as coal and oil.

From Europe, to this year's coal conference as to the first one in 1926, came the most ingenious and promising methods of converting coal into other things. Dr. Carl Krauch, German dye-trust chemist, told how, through the magic of catalysis and hydrogenation, coal is made into gasoline, lubricating oil, kerosene, paraffin, alcohol, fats and nearly any other hydrocarbon that the market may desire. Dr. Friedrich Bergius, the Heidelberg chemist whose hydrogenation process, first reported to the 1926 coal conference, is now used and controlled by the German dye trust, announced the conversion of the cellulose and lignin of wood into artificial coal, the process used by nature millions of years ago in the manufacture of coal. Dr. Fritz Hofmann, veteran German chemist, affirmed but did not explain the production of real rubber from coal. From France and other laboratories in Germany there came papers telling of intensive researching upon the vital problem of making from coal, which Europe has, the gasoline, lubricants and other products that must at present be imported. Necessity is the reason why this sort of research is more intense in Europe than in America. Our country, richer in natural ready-made products, has devoted its brains and energy to better methods of cracking its petroleum or burning its plentiful oil and coal.

It is significant and encouraging that much of the pure scientific research, the romantic delving into molecular and atomic love affairs, that formed the foundation of European industrial applications was done here in America. Professor Hugh S. Taylor, of Princeton, did much pioneer work on catalysis, in which one substance eggs on others to do something without being itself altered.

England has been more interested in the process of coal treatment known as low temperature carbonization. Instead of coking the coal at a high heat, as is done in the familiar by-product coke ovens of America, the volatile matter in the coal is driven off at a much milder temperature, preserving and producing more of the valuable liquid and gaseous products of coal. Low temperature processes are of great interest to America and, in fact, the largest low temperature carbonization plant in the world is now being erected in New Jersey.

Coal production in America has actually decreased in recent years due to the increased use of oil as fuel, F. G. Tryon, of the U. S. Bureau of Mines, reported to the conference. And the oil industry is borrowing the latest coal research developments to make its production more efficient. The German methods of liquefying coal have been brought to America and set to work getting a larger percentage of gasoline out of crude oil. A paradoxical development reported to the conference by Professor Walter F. Rittman, of the Carnegie Institute of Technology, was the actual commercial production of artificial bituminous coal from crude oil residues as a by-product of the production of gasoline.

Since large amounts of raw coal will still be burned despite the new treatments and transmutations that are possible, new combustion methods are being developed. Pulverized coal has propelled its first sea-going vessel, the *S. S. Mercer*, C. J. Jefferson, of the U. S. Shipping Board, and Commander J. J. Broshek, of the U. S. Navy, told the conference. In Germany an internal combustion engine of the Diesel type has been built to feed on powdered coal and abroad locomotives fired by coal dust draw trains. Great power plants are being built here and abroad to use the finely divided state of coal.

For power production coal or other combustibles are not a necessity as hydroelectric plants have demonstrated. To the coal conference was reported a power production method that promises to be another fuel competitor. Georges Claude, the French scientist, whose name and genius is associated with ammonia synthesis, liquid air and neon lights, proposes to tap energy of the sea, the temperature falls of the ocean. In Belgium a power plant of sixty kilowatts runs on the temperature drop of thirty-three degrees Fahrenheit. In the warm tropical

waters of Cuba whose depths are always cold, he proposes to build a larger power plant utilizing the free power of the sea's temperature difference. Eventually he foresees Florida and southern California benefiting from his new invention.

The two years since the first Carnegie coal conference, as summarized in the papers presented this year, exceeded in achievement even the prevision of Dr. T. S. Baker, president of the Carnegie Institute of Technology, whose planning and energy made possible the international conferences. The effects of such vigorous world congresses upon world industry can not be properly appreciated contemporaneously, but the 1,800 representatives of twenty nations attending will take back to their plants and laboratories new ideas and enthusiasms. Those attending the conferences can not help but feel that the prosperity of CHON industries are fully as dependent on science as on economics, if not more so.

An important by-product of the coal conference should be a growing realization that rampant nationalism is as obsolete as the open-coal grate. Wars, always wasteful, need not be fought for raw materials. All nations have them in some form. Scientific conquests are more lasting than military successes. At the coal conference Germans, French, English and Americans worked together. The genius of discovery and research in any part of the world in these accelerating days soon conquers the whole globe.—*Watson Davis.*

THE MALAYSIAN ECLIPSE

ASTRONOMERS from the U. S. Naval Observatory in Washington and from the Sproul Observatory, Swarthmore, Pa., will join with colleagues from Germany, England, Italy, France, Holland and Australia, in observing the eclipse of the sun visible in this part of the world next May. It will be the best eclipse in recent years, and will occur in the afternoon of May 9. The path of totality, along which falls the shadow of the moon and in which the disc of the sun will be completely obliterated for a few minutes, begins to the east of South Africa, in the Indian Ocean. From there it passes in a northeast direction to the Malay Archipelago, where it first touches easily accessible land.

In Malaysia it crosses the northern end of Sumatra, then the Malay Straits, the southern part of Siam and the northern part of the Malay Peninsula, the Gulf of Siam, Cochin China, the South China Sea, and some of the southern Philippine Islands. The largest of these are Palawan, Panay, Negros, Cebu and Leyte. Then it passes into the Pacific Ocean where it ends.

Though along part of its path the eclipse lasts 5 minutes and 7 seconds, this part is out in the Indian Ocean. The Simeuloe Islands, west of Sumatra, are nearest to the maximum, where the total eclipse will last nearly that long. In Sumatra, it will last five minutes, and in the Philippines about three and a half minutes.

Captain C. R. Freeman, of the U. S. Naval Observatory at Washington, has announced that their expedition will go to Iloilo, on the island of Panay. This is one of the largest towns in the path of totality. It has about 50,000 inhabitants and is provided with banks, hotels, machine shops and other features which visiting astronomers may need. Telegraph, radio and telephone connections will enable the outside world to be informed promptly of the outcome. The Panay and Negroes Telephone Company supplies most of the towns in this part of the path, and the company has offered the free use of its lines to visiting astronomers. Dr. R. L. Waterfield, of the Johns Hopkins University, is also planning to observe it from Iloilo.

The Sproul Observatory, under the direction of Professor John A. Miller, who has observed more eclipses than any other astronomer, will send a party to Sumatra. There will also be a Dutch expedition in Sumatra as well as one from Australia. A German party from Potsdam will go either to Sumatra or Siam. There will be two British groups. One, from Greenwich, will go to Alor Sta, in Kedah, in the Malay Peninsula. The other, from Cambridge, will make its headquarters at Pattani, in Siam. There will be a German party, from Kiel, in Siam, at Khoke Rhode. A third German expedition, from Göttingen, has not yet announced its site, while a fourth, from Hamburg, will be neighbors of the U. S. naval astronomers at Iloilo. A French party will go to Cochin China. There will also be one from Italy, but their location is still unknown.

Perhaps the most important observations to be made will be the photography of the corona. This is the outer part of the sun, and though extending for as much as a million miles from the sun's surface, is ordinarily invisible because of its faintness. Only when the opaque moon obscures the bright globe of the sun does the corona flash out. An eclipse of the sun can not possibly last more than 7 minutes and 40 seconds. Most are much shorter, and as one that can be satisfactorily observed occurs on the average only once in several years, the astronomers make the most of their opportunities of observing this important part of the sun. Other observations will be made of the flash spectrum, at the beginning or end of an eclipse. This gives important knowledge of the outer layer of the sun, the "chromosphere." The English astronomers will also observe the "Einstein effect." This is the deflection of the light of stars as they pass the sun, and can only be observed during a total eclipse. This is one of the experimental proofs of the Einstein theory of relativity, and though it was found to exist at eclipses in 1919 and 1922 further evidence is desirable.

BLOOD CHEMISTRY AND DRUG ACTION

THE effect of a dose of medicine depends not merely on the chemical make-up of the medicine itself, but on the chemical state of the blood in our bodies when we take it. This is indicated by the experiments of Dr. William Salant, of the University of Georgia Medical School, performed here and at the Cold Spring Harbor Biological Station on Long Island.

The blood of all warm-blooded animals is normally slightly alkaline. When Dr. Salant injected doses of the drug ergotamin into experimental animals whose blood alkalinity had been artificially reduced, a marked de-

pression in their blood-pressure resulted. It was possible to restore the pressure to normal or even to increase it beyond that point, simply by controlling the degree of alkalinity of the blood.

The effects of a drug depend not only on the alkalinity of the blood, but also on the particular balance of certain elements. Dr. Salant has found that the concentrations of calcium and potassium in the blood are of special significance in this respect. If the blood is lacking in calcium, adrenalin, a powerful stimulant and energy-releasing secretion, can not produce results. Even a considerable reduction in the calcium content inhibits the action of adrenalin, unless the potassium present is correspondingly reduced.

If much potassium is present, the poisonous effects of nicotine are greatly increased, and in the presence of an excess of potassium the usually stimulating adrenalin reverses its behavior and becomes a depressant.

The toxicity of mercury is greatly increased by reducing the calcium concentration in the blood. But if the calcium content is increased the resistance to this poison, and also to arsenic, is correspondingly increased. This point may eventually become one of importance in medical practice, because both mercury and arsenic, though poisonous, are widely used in medicine, especially in the treatment of syphilis. The diet of the patient, in so far as it affects the potassium and calcium content of his body fluids, becomes a matter of concern in the light of Dr. Salant's researches. It is recognized that the average American diet is very low in calcium.

UNDULANT FEVER AND TULAREMIA

THE conquest of the world's latest threatening disease, undulant fever, is causing heavy casualties among the scientists who are engaged in the fight. While the disease is not often fatal, it is highly infectious and almost all the men and women who have been studying it have acquired it, in spite of every precaution. In this respect undulant fever is like tularemia, another comparatively new disease. These two are causing grave concern in public health circles because of their rapid and wide spread during the last few years. Tularemia, besides being very infectious, also results in death in many cases.

In this country four scientists of the U. S. Public Health Service have suffered from undulant fever, the latest one attacked being Dr. Edward Francis, who also acquired tularemia when he was investigating that disease. He had recovered, however, from tularemia before the attack of undulant fever. Of the others attacked by undulant fever, one, B. T. Stockrider, a laboratory technician, has entirely recovered. The other two, Miss Alice Evans and Dr. G. C. Lake, have recovered sufficiently to resume their work, but they have not yet regained health entirely, and are still subject to return attacks of the disease. It is these recurring attacks after periods of apparent recovery which give the disease its name of undulant fever.

Tularemia always attacked the laboratory workers during the first work done on it. All six of the men who studied it for the U. S. Public Health Service acquired it, some of them had it twice. The same thing has been observed in other countries. The Lister Institute of London recently asked the Public Health Service for cultures of the organism causing tularemia, so that their scientists could study the disease. When the cultures were sent, warning was also sent that it must be handled with extraordinary care. In spite of this, one of the workers at the institute acquired the disease. Knowledge gained in the study of the disease has now taught the investigators how to handle it safely.

Tularemia is usually acquired from rabbits who have the disease. Undulant fever may be acquired from infected goats, cows or other cattle or from their milk.

ITEMS

THE amount of influenza in the country is increasing, according to telegraphic reports received by the U. S. Public Health Service. The number of cases reported for the week ending November 24 is 8,433. For the preceding week 5,017 cases were reported. California and South Carolina still lead the country in number of cases. For the week just ended California reported 4,843 cases and South Carolina 1,770 cases. California had an increase of over a thousand cases in the last week. The other western states, including Montana, Utah, Oregon and New Mexico, all reported large numbers of influenza cases. The other communicable diseases are running their usual course for this season. Measles is especially prevalent in the middle Atlantic states, and is higher for the country as a whole this week. Smallpox is also higher. Vaccination, of course, is the means of preventing this disease.

THE passage of the Arkansas anti-evolution law will be the signal for a stiff fight by the American Association of University Professors for the right of their colleagues to teach science according to the laws of nature rather than according to the dictates of the anti-scientific forces of southern rural districts. This was indicated by Professor A. O. Lovejoy, of the Johns Hopkins University, prominent in the councils of the association, in an interview with *Science Service*. "We did not take part in the pre-election fight over this law," said Professor Lovejoy, "because we knew that the people in Arkansas would be sensitive and resentful about outside interference. But now that it is on the books it can be attacked—and we think successfully—on constitutional grounds. The American Association of University Professors will probably take action at an early date." The association has an active chapter at the State University comprising most of the faculty who are eligible to membership.

GREAT BRITAIN is planting new trees at the rate of 1,000,000 a week, according to information reaching the U. S. Department of Agriculture. Before the war the British Government estimated that there were about 3,000,000,000 feet of standing timber in the British Isles, while to-day it is estimated that the timber resources have been reduced to half that amount.