SCIENCE NEWS

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THE NOBEL PRIZE IN CHEMISTRY

THE German winners of the Nobel Prize in chemistry, Dr. Friedrich C. R. Bergius and Dr. Carl Bosch, of Heidelberg, are two of the world's foremost practitioners of the magic of industrial science. Dr. Bergius has for many years performed marvels in the transformation of coal, changing it into motor fuel, lubricating oils, methanol (formerly known as "wood" alcohol) and other substances. He had developed a scientific theory on the things that must have happened to the plants of long ago to turn them into coal; and his latest feat has been to indicate the possibility of making sugar out of wood on an industrial scale for the manufacture of alcohol. A firm for the commercial exploitation of this process is already in existence.

Dr. Bosch, sharer of the prize, and head of the German chemical manufacturing firm, the I. G. Farbenindustrie, has specialized in the building up of cheap nitrogen into more valuable products, as his associate has worked on the building up of cheap carbon. Dr. Bosch's great achievement has been the perfection of a practical method for catching nitrogen from the air so that it can be combined with hydrogen to make ammonia by the Haber process. This in turn is used in the manufacture of fertilizers. Thanks to this process, blockaded Germany literally lived on air to a considerable extent during the war, and even captured from the atmosphere an indispensable ingredient for smokeless powder, TNT and other explosives.

Dr. Bergius was born in 1884 near Breslau, and studied at the Universities of Breslau, Leipzig and Berlin and the Technical University of Karlsruhe. Dr. Bosch was born in 1874 in Cologne, and studied at Cologne, Charlottenburg and Leipzig.

THE USES OF THE RESPIRATOR

FOR their invention of the respirator, which has maintained respiration and life in hundreds of infantile paralysis patients this past summer and fall, Professor Philip Drinker and Mr. Louis A. Shaw, of the Harvard School of Public Health, were presented with the John Scott Medal for 1931 at the Franklin Institute on November 18.

The respirator is a machine which was designed to replace manual methods of artificial respiration in cases in which the procedure must be carried out for long periods such as days or weeks. It was developed at the request of the Liability Insurance Fund of the New York Consolidated Gas Company.

At present there are some 150 adult type respirators in use in the United States and Canada and one each in London and Copenhagen. In New York City alone over a hundred cases of respiratory failure not caused by infantile paralysis have been treated with a high percentage of recoveries. These cases included severe carbon monoxide poisoning, drug poisoning, acute alcoholism, drowning, electric shock and the like.

During the last infantile paralysis epidemic, over 100 patients were treated in Boston, while in New York City, where there are twenty machines, Professor Drinker estimated that even more patients were treated. Of 180 cases of infantile paralysis admitted to the Children's Hospital in Boston, the death rate was only 4.5 per cent., probably one of the lowest in the epidemic.

The respirator has been used daily with good results in the after-care of patients who had originally been kept alive by its continuous use during the acute stage of their illness. The infant type, of which there are now about fifty in use, was designed for starting normal respiration in new-born babies who breathe with difficulty or not at all.

Professor Drinker described the respirator as follows: "The adult model consists of a sheet metal tank with a movable end. The patient lies on a comfortable bed with his body inside the tank and his head protruding through a loose fitting rubber disc or collar. By means of a suitable pump, a slight negative pressure or partial vacuum is created within the tank causing the patient's chest to expand and air to rush in through his nose and mouth. Pressure within the tank is then raised to that of the room, and the patient exhales in a normal manner. The depth and rapidity of the breaths taken by the patient are under control of the attending nurse, and can be altered at will."

PROFESSOR AARTOVAARA AND ELEMENT 87

BLINDNESS threatening Professor Gustave A. Aartovaara, of Helsingfors, Finland, in his search for the missing chemical element 87, has aroused the anxiety of scientists of the U. S. Bureau of Standards, who have been working with him in seeking one of the last two remaining building blocks of the universe. Glass fragments severely injured his eyes as a result of an explosion of his apparatus.

As a third competitor in the race to identify this elusive metallic element, Professor Aartovaara, of the Helsingfors Technical University, had sent a sample of his preparation to be examined by Dr. W. F. Meggers, of the U. S. Bureau of Standards, whose report on the optical spectrum has just been announced. The announcement comes on the heels of a rival claim by Professor Jacob Papish, of Cornell University, who declared he found the missing alkali in the rare mineral samarskite. The third contestant for the honor of completing the chemists' periodic table is Professor Fred Allison, of the Alabama Polytechnic Institute, who first announced the discovery of the missing alkali about a year ago, through the use of a magneto-optic method of his own invention.

No specific evidence that the Finnish preparation actually contains number 87 has been found, Dr. Meggers announced, though the spectra of all the related alkali metals, including sodium and potassium, were found. The crucial lines in the optical spectrum, he stated, will

lie in the infra-red region where investigation is troublesome. In Dr. Meggers' opinion, only the x-ray spectrum, used by the Cornell investigators, can decide the question definitely. On the other hand, Dr. Meggers doubts if Professor Papish has given convincing measurements actually proving the existence of number 87 in his extract.

Professor Aartovaara's substance differs from those of Professor Allison and Professor Papish in that it is radioactive, as might be expected from its nearness to radium in the periodic table of chemical elements. The reported explosion that injured Professor Aartovaara is believed to have been due to the action of the radioactive rays on the solution. Chemists recall, however, that a radioctive alkali solution was examined in 1908 for the missing element by the German chemist, Ebler. None was found. The activity was due to a trace of a known radioactive element. Other similar hopes entertained by investigators about radioactive alkali preparations have all been unfulfilled in the past.

THE METEOR SHOWER

SHOOTING stars at a rate as high as one every twenty seconds were observed by Dr. Charles P. Olivier, director of the Flower Observatory of the University of Pennsylvania, during the Leonid meteor shower through which the earth has just passed. Dr. Olivier has just returned from Ulster County, New York, where he observed the Leonids from the estate of Mr. John A. Kingsbury, New York amateur astronomer. High in the Catskill Mountains, this location had perfect weather while the lower ground for most of the surrounding region was enveloped in thick fog.

The greatest display was seen early Tuesday morning, November 17, Dr. Olivier reported to *Science Service*. With the assistance of ten other observers, a total of 2,500 meteors was reported, but allowing for duplicates, there were probably about nine hundred separate ones visible from this location. There were a number of fine fireballs, including two with trains that lasted twelve minutes each. Professor Olivier himself observed 266 meteors, which came fastest during the half-hour from 3:30 to 4:00 A. M., when he saw ninety.

Professor Olivier is waiting for reports from volunteer observers throughout the country, and can not make a definite comparison between this year's shower and those of the past until these are studied. He stated, however, that he saw more meteors this year than he did in 1901, when the best display since the famous one of 1866 was observed.

Though not as fine as this year's, the shower of 1930 was also much better than for many years previous, so that now astronomers have more hope that 1932 or 1933 will bring a shower rivalling those of 1799, 1833 and 1866. Then the entire sky was said to be covered with meteors, like the ribs of a gigantic umbrella, all radiating from the constellation of Leo, the lion.

A return was expected in 1899, but did not materialize. It was later found that the previous gravitational attraction of Jupiter had switched the main stream of meteors aside so that it missed the earth. It is possible, however, that the swarm has been shifted back since then, and the fine displays of 1930 and 1931 make this seem more likely. Last year, as this, the main display was seen on the morning of the seventeenth, a day or so later than in the past.

THE COAL INDUSTRY AND THE ADVANCE OF TECHNOLOGY

FOR the presentation of the world's latest knowledge concerning a priceless gift of nature, scientists from fifteen countries have been holding in Pittsburgh sessions of the Third International Conference on Bituminous Coal. Dr. Thomas S. Baker, president of Carnegie Institute of Technology and host to the visiting scientists, said that "coal, the cheapest of our essential commodities, is now synonymous with economic distress and unhappiness. The scientist is striving to draw from it more substances which will be of service to mankind."

In spite of the fact that the coal industry is so in the throes of depression that the miner is poverty-stricken and the owner is suffering losses, conditions of this kind are not necessarily the result of technical advance resulting in the increased use of machinery, it was explained in an address by Myron C. Taylor, chairman of the finance committee of the U. S. Steel Corporation.

"It is commonly known," Mr. Taylor said, "that since the close of the war the high cost of labor has stimulated the use of labor-saving devices, but when we turn to the census reports for 1920 and 1930 we find that in 1920, 39.3 per cent. of the total population were engaged in gainful pursuits, while the 1930 census reports show that 39.8 per cent. of the total population were so engaged."

Competition from other sources of energy and from the development of better methods of combustion were cited by Mr. Taylor as causes of the coal industry's suffering. In 1913, he stated, 84 per cent. of the country's energy was supplied by coal while in 1929 this figure had dropped to 60 per cent., the remainder being furnished by petroleum, natural gas and water-power. It was also pointed out that the efficiency of public utility power plants has been more than doubled, that better combustion saves the railroads a quantity of coal each year and that modern coke ovens require annually 300,000,000 tons less coal than would be needed if old ovens were still in use.

"These figures," according to Mr. Taylor, "show the power of research and invention. What has been done in reducing the consumption of coal should continue to be stressed by the coal industry in bettering its production."

THE PART OF BACTERIA IN MAKING COAL

BACTERIA are working more than three thousand feet deep in the earth to revise those parts of the schoolboy's text-books that tell how coal was formed, while up on the surface cousins of the deep-dwelling bacteria, also new to science, are being made to take the poison out of illuminating gas, change hydrogen and carbon

monoxide into acetic acid and the acid into methane gas, and to do for the research chemist many other strange tasks that may grow into important industrial processes. Thus may be summarized reports of some of the latest scientific investigations presented at Pittsburgh before the Third International Conference on Bituminous Coal, by prominent investigators from Germany, one of whom is Dr. Franz Fischer, director of the Kaiser-Wilhelm Institute for Coal Research in Berlin.

The widely held belief that coal was formed from ancient plants which, during geologic periods of time, first turned to peat, then to brown coal, then to soft coal and finally to hard coal under the pressure of thick strata of rock, is crumbling, according to Dr. Fischer. Coal was made from ancient plants, all right, but the part that bacteria had in its formation has been overlooked.

According to this view, which has been shaping itself for a number of years, hard coal did not necessarily have to become consecutively peat, brown coal and soft coal before assuming its final form. It might have been made in this fashion and probably often was, but if the right plant substances and the proper kind of bacteria were present the plant matter, with the help of the microorganisms, could have turned into hard coal, or any other kind except peat, by a short-cut method.

"Living bacteria may be found not only in brown coal deposited at shallow depths, but even in bituminous coal at depths of more than three thousand feet," Dr. Fischer said. "Whether these bacteria are still causing a further change in the coal can not be answered immediately. However, since they are living they must acquire energy for certain processes of metabolism. On the other hand, as they occur only in small quantities it is conceivable that in spite of the long period of time they are not of essential significance and that in the case of bituminous coal they do not contribute to the production of methane and the resulting explosions."

By way of studying further the new theory of coal formation, Dr. Ernst Terres, of the Institute of Chemical Technology at Charlottenburg, speeded up in his laboratory the geologic age-long process of making coal to just a little more than two years. Dr. Terres said that he fermented peat moss and then heated it under pressure to make artificial brown coal. He agrees with Dr. Fischer in part, concluding that the plant substance lignin, not cellulose, as is generally believed, is the material from which peat, brown coal and some bituminous coals are made. Dr. Ernst Berl, of Darmstadt, on the other hand, said that he has not been able to make from lignin a substance similar to coal, while he has satisfactorily produced artificial coals from cellulose.

Inspired by experiments with bacteria from coal mines, Dr. Fischer put some of their cousins from sewage sludge into an atmosphere of hydrogen and the poisonous gas carbon monoxide. Later he found that the carbon monoxide and hydrogen had disappeared, to be replaced by water and methane, an illuminating gas. Dr. Fischer noticed that in changing the poison, the bacteria formed an intermediate product, acetic acid.

ITEMS

THE Kennelly-Heaviside layer, radio roof of the world, has been shot to pieces by the recent Leonid shower of meteors, according to Dr. A. M. Skellett, of the Bell Telephone Laboratories at Deal, New Jersey. The meteors, bursting down into the atmosphere, lose most of their speed about seventy miles above the surface of the earth, at about the same region where ascending radio waves are turned back on their course by the Kennelly-Heaviside reflecting layer. A cloud of electrified particles accompanies every meteor in its descent. When the meteor enters the Kennelly-Heaviside conducting layer this disturbs the condition of balance so that the effective height of the layer is temporarily lowered. A fogging of radio signals results from this.

A WARNING to parents, physicians and health officers that a large increase in diphtheria cases is due this winter has been issued by the Medical Society of the County of Kings. According to previous experience with the diphtheria cycle, this winter will show a distinct upward trend in the number of cases of this disease. Health reports thus far bear out this prediction. For the week ending November 14 there were 2,584 cases of the disease reported to the U. S. Public Health Service by state health officers all over the country. This is an increase of about 100 cases over the total for the previous week, and of nearly 1,000 cases over the total for the corresponding week of 1930. An epidemic of this disease can be prevented by the thorough use of toxin-antitoxin or toxoid, which give protection against diphtheria.

THIRTY million dollars is being spent as the first move to clean up the most polluted harbor in the world, and the work that will cost that amount has been started on a new sewage disposal plant for New York. The new plant will treat a flow of 180 million gallons of sewage daily, purifying part of the tremendous stream of waste water which continually empties into the harbor and its branches, it will be revealed in the forthcoming issue of *Civil Engineering*, published by the American Society of Civil Engineers. Incorporating features of design applied successfully elsewhere, the plant will serve one fifth of greater New York. It will be located at Ward's Island in the East River, and several years will be required to complete it.

BLACKFOOT INDIANS will eat buffalo meat this winter. The "strong food" on which their warlike ancestors fed has been denied Indians as well as white men ever since the near-extermination of the bison at the end of the "Wild West" days. Now, however, the government-protected herds in Yellowstone National Park and elsewhere are more numerous than their natural range warrants, and surplus animals have to be disposed of every year. This year the Blackfoot on the reservation near Glacier Park, Montana, are facing a lean winter because grasshoppers and drought took too heavy a toll on their lands last summer. So Superintendent Aven Scoyen, of Glacier National Park has arranged to have one hundred old bison supplied to the Indians, to be killed for meat.