

GEOLOGY

Bacteria May Have Helped In Formation of Anthracite

German Scientist Speeds up Geologic Process and Produces Coal in Laboratory in Little Over Two Years

MICROSCOPIC "bugs" are working more than three thousand feet deep in the earth to revise those parts of the schoolboy's textbooks 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 scientists from Germany, one of whom is Dr. Franz Fischer, director of the Kaiser Wilhelm Institute for Coal Research in Berlin.

Old Idea Crumbling

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 scientists have overlooked the part that bacteria had in its formation, he holds.

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 cannot be answered immediately. However, since they are living they must acquire energy for certain processes of metabolism . . ."

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.

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, which is the stuff that makes vinegar sour.

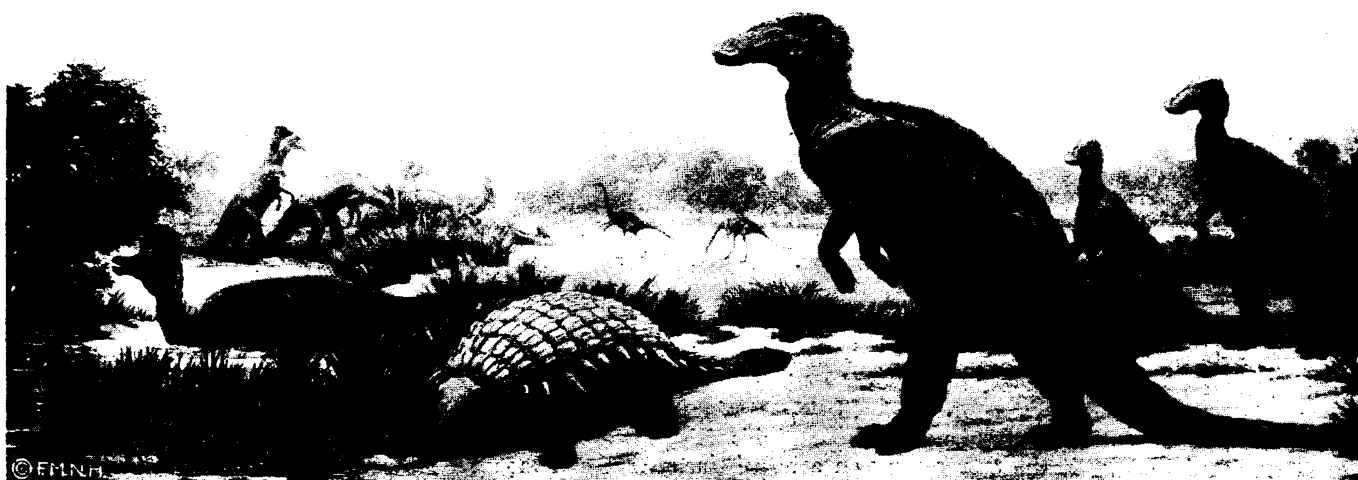
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PUBLIC HEALTH

Public May be Misled By Vitamin Advertising

HALF-TRUTHS in the advertising of vitamin content of foods are very likely to mislead the public, Prof. H. C. Sherman, of Columbia University, authority on vitamins, warned in an address before the Association of Official Agricultural Chemists at Washington.

So-called "vitamin rich" foods, said Prof. Sherman, may actually be grossly lacking in the vitamins A, C and G, necessary to maintaining a buoyant state of health, though containing enough of vitamins B, E and D. Official chemists, he said, must tackle the problem of



ROCKY MOUNTAIN REPTILES OF SIXTY MILLION YEARS AGO

At left and right are seen three species of duck-billed dinosaurs: hooded, crested, and common. In the foreground is an armored dinosaur, and in the middle distance are seen a pair of bird-like dinosaurs. This restoration, a mural painting, is on exhibition at the Field Museum of Natural History. It is a gift from Charles R. Knight.

measuring the amount of each and all of these six or more chemically different substances in foodstuffs if they are to guard the nation's food supply.

Commercial irradiation of foods with ultraviolet light, so widely advertised, increases only the vitamin D amount, and is where "we are most likely to meet the problem of what constitutes proper advertising of vitamin value in food," said Prof. Sherman.

Milk to which irradiated yeast rich in vitamin D, has been added, he said, may properly be advertised as superior in its vitamin value, as milk itself is at all times a good source of all the other known vitamins. But this is not true of

a food which is deficient in several of the vitamins.

Enough of a vitamin merely to prevent disease, Prof. Sherman continued, is not a satisfactory standard for the American people.

He said: "We must conclude that of vitamins A, C and G we need, in order to do our best, amounts several fold larger than are needed to prevent the characteristic signs of deficiency or even to support fully normal growth. We want our people to have not merely enough to escape actual deficiency, but enough to enable them to do their best."

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PLANT PHYSIOLOGY

New Process Saves Fruit By Detecting Minute Scratches

ORANGES and other fruits that suffer heavy spoilage from blue mold and other fungi can be saved from this loss by a new method for detecting mold-susceptible specimens, the invention of Rev. Hugh T. O'Neill and Dr. Arthur J. Harriman, both of the faculty of the Catholic University of America.

The inventors discovered that mold infection always takes place through breaks in the skin, such as may be made by clipper cuts, the fingernails of the workers, box splinters, projecting nails, etc. A whole-skinned orange never spoils. They were able to demonstrate this point by keeping more than 400 sound oranges in a damp, dark cellar for a period of three months (May 1 to July 30) without losing one of them through moldiness, though moldy oranges were kept among them to provide sources of possible infection.

Knowing thus that fungus spores can start trouble only if the skin is scratched or broken, the inventors next attacked the problem of making visible the microscopic nicks and scratches that escape detection in the grading as practiced hitherto. They hit upon the scheme of using some substance that would enter these scratches and make a streak of contrasting color against the yellow skin. Of such substances, the most practicable is a metallic salt that will react with the tannin in the tissues just under the skin and form a dark, conspicuous compound. A salt of iron, preferably ferric chloride, is especially recommended. Any minute abrasion in

the peel of the fruit is immediately made visible as a black line. Sound fruit is left entirely unmarked. All fruit, sound or unsound, is then washed in clear water so that all ferric salt is removed. The fruit then reaches the consumer without any substances that are poisonous or antiseptic. This obviates the use of borax, a substance much used to prevent blue mold infection, but open to grave objection where such fruit is used to make marmalade or might be sucked by children.

Father O'Neill, together with Dr. Harriman, has taken out patents on the process. Several of the leading fruit-packing firms have become interested in its commercial application.

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ENGINEERING

"Making Weather" Hailed As Big Industry of Future

"THE AVERAGE man has come to realize that there is something the matter with the air he breathes ordinarily, and he is seeking to do something about it," said Thornton Lewis, Newark engineer, in an address before the American Society of Heating and Ventilating Engineers at Philadelphia. And out of this "air consciousness" has grown a new industry that will mount to an annual figure of more than \$250,000,000 within the next twenty years, the speaker predicted.

The "making of weather" is an indus-

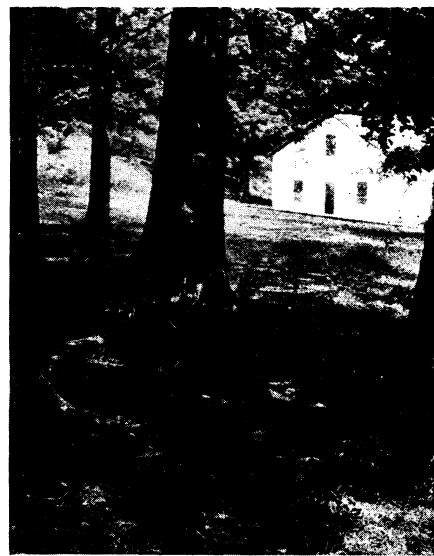
try scarcely a dozen years old, but its importance is being more and more felt, and it is now an exact science, based upon definite knowledge relating to the behavior of air under all known conditions, continued Mr. Lewis. The newest and probably most interesting application of manufactured air is in its application to railway passenger cars, but a most fertile and almost untouched field will be found in homes.

While an average of 32,000 homes each valued at \$10,000 or over are built annually in this country, not more than 1,000 have been air-conditioned in the last three years. And there are less than half a dozen office buildings out of 6,500 which are air-conditioned. Hospitals, churches, and hotels are conspicuous for the absence of any systems. All this, Mr. Lewis feels, points to a great growth in this vital industry.

Not only will health be benefited but an excess of something like 3,000,000 additional kilowatts of power will be utilized, offering an outlet for additional electrical energy.

Since ice is used for conditioning air in homes and small installations, Mr. Lewis sees in manufactured weather the salvation of the ice industry, now suffering from competition offered by the household mechanical refrigerator. Over 150,000 tons of ice, valued at a wholesale price of \$600,000, will be used, he predicted.

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TREES SWALLOWING BOARDS

Make up the unusual sight that greets visitors in Orkney Springs, Va. Years ago the boards were set between the bases of the trees, to serve as seats; secondary growth has pushed far out over them, and may in time cover them completely.