

COAL STRUCTURE BEING STUDIED

Bureau of Mines Conducting Microscopic Investigation at Pittsburgh Station.

OLD TESTS ARE UNRELIABLE

Reinhardt Thiessen, Research Chemist, Says Scientists of the Past Only Had a Vague Idea of the Composition of Coal.

Washington.—Conceptions of the origin, composition and general nature of coal held by scientists in the past are so different and contradictory that it is a difficult matter to determine the real extent of knowledge available or to rely on the literature, says Reinhardt Thiessen, research chemist of the bureau of mines. Scientists in general had only a vague idea of the composition of coal, the origin of its constituents, the transformation they have undergone, and the conditions they now are in.

The chemist did not have enough fundamental knowledge to attack its chemistry in the right directions. The fuel engineer, in turn, did not have a broad enough chemical basis for studies in combustion, distillation, cooking and other processes relating to the use of coal, hence the efficient utilization of coal in the industries has suffered from the lack of a proper knowledge of the nature of coal itself.

The bureau of mines, in order to clear up some of the confusion that exists and to get a more exact knowledge of the nature of coal in general, as well as to obtain certain fundamental facts, has been conducting at its Pittsburgh station a microscopic study of the structure of coal. One of the great hindrances to its study, from the time of the earliest investigators to the present, has been the difficulty in preparing thin sections for microscopic observation. Many attempts had been made to overcome this difficulty, and also to devise other means of study.

For a number of years the ash method was pursued, bits of coal being either totally or partly burned and the ash examined under the microscope. Later, maceration was tried with some success, but on the whole it failed to reveal the true nature of coal. More recently the method was tried of softening the coal with reagents and then cutting it into thin sections with a microtome. But this changes the coal too much to show its true appearance, besides the method is inexpedient.

Used Rock Method Study.

For the bureau's work an adaptation of the method used successfully for years by petrologists in studying rocks and paleobotanists in studying plants was employed. A small rectangular piece of the coal to be examined was placed and polished on one surface, which was then cemented to a glass slide with a mixture of Canada balsam and marine glue. The piece was ground to a safe thickness on a lapidary's wheel and was finally ground to transparent thinness by hand on a fine hone. Examinations were then made through the microscope at magnifications ranging up to 2,000 diameters.

The bureau says that even with the naked eye a bed of any bituminous coal is readily seen to be banded, and a chunk of coal is seen to be highly laminated and composed of layers varying greatly in thickness and in color, texture and fracture.

There are generally recognized and described two kinds of coal with respect to its texture; compact coal and mineral charcoal or mother-of-pearl. In the compact coal, in general, two kinds of bands are recognized, apparently alternating and in sharp contrast. The one is of a bright jet-black, pitchy appearance and breaks with a conchoidal smooth, shiny fracture. The other is grayish black, of a dull appearance, and breaks irregularly. The former is generally called "bright coal" or "glanz coal" and the latter "dull coal" or "matt coal." The bright coal consists of lenticular masses greatly varying in thickness and breadth and entirely surrounded by or imbedded in the "dull coal."

From the study at high magnifications it has been definitely shown that the "bright coal" represents constituents that at one time were pieces of wood, as of trunks, stems, branches and roots. They are called "anthraxylon." The "dull coal" is extensively sublaminated into thinner sheets of "bright coal" and "dull coal." These thin sheets of "bright coal" also consist of definite components and are imbedded in a dull granular appearing matter. The "dull coal" may therefore conveniently be divided into two classes—the thin black shiny strips and the highly comminuted material, termed attritus, in which they are imbedded.

Derived From Plants.

It is conclusively shown that the

thin strips of bright coal are also derived from woody parts of plants, and are anthraxylon, but represent thinner and smaller fragments than the thicker strips. There is no real distinction between the larger, and the smaller or thinner anthraxylon constituents, there being a complete range in intermediate sizes, but the smaller are the more numerous. Some coals are largely made up of the thinner anthraxylon strips.

The attritus is composed of a number of groups or classes of constituents, most of which can be definitely identified and their origin determined.

These are the degradation products of cellulose (the essential constituent of cell walls), humic matter, spore exines, resins, remains of cuticles, highly carbonized material rodlets and some mineral matter. All are readily distinguishable in the photomicrographs.

Examination of a number of coals has shown that most of the coal is derived from the woody parts of plants, such as trunks, stems, branches and roots, including all the tissues that make up such parts. Some of this wood is represented by the larger anthraxylon, some by the smaller anthraxylon and some by the attritus. The proportion represented in each of these varies in different coals and even at different levels in the same coal bed. There is evidence that some of the cellulose matter is derived from the more delicate tissues, such as herbaceous plants, young or growing parts of plants, leaf tissues, etc.

The humic or decayed vegetable matter forms a considerable proportion of the attritus of all coals. It is derived from the cellulosic parts of plants, but includes, besides macerated, semi-decayed wood, some macerated gum, bark, pith, cortex and other more delicate parts. There is no sharp dividing line between the anthraxylon and the humic constituents.

Resins are found in all coals, but in greatly varying proportions, both in the anthraxylon and the attritus. When found in the anthraxylon, the resin is found in those tissues where it would be expected if the constituent were still a sound piece of wood. In the attritus the resins are easily distinguished from the other constituents.

Comparing Different Coals. The exines or outer walls of spores are present in the attritus only and form an important part of all coals, but in greatly varying proportions. The spore exines are the most readily discernible constituents in all coals, and have definite characteristics. Different genera and perhaps different species of exines differ in sculpturing, size, form and thickness of wall, and by means of these characters can readily be distinguished from one another. The spore characters have been so well preserved in almost all coals that the spores of one kind of plants can be clearly distinguished from those of another kind. In some coal seams the larger bulk of the spore exines are of the same kind, in other seams two or three kinds may form the main bulk.

In comparing coals from different beds the predominating exines of one seam are easily seen to be different in some way from those of any other bed. Thus the coals of different beds, containing different spores, may readily be distinguished from one another. Occasionally in a given coal seam a spore exine is found that differs from those of any other seam, but does not predominate. This spore exine may be a distinguishing characteristic of the coal seam in question, although not the predominate one. This fact promises to be of value in the stratigraphic correlation of coal seams. The Pittsburgh seam, for example, contains a small spore exine that is both predominant and characteristic and may thus be easily distinguished from any other.

All ordinary bituminous coals contain certain constituents that are more highly carbonized than the rest of the coal and stand out in sharp contrast to it on account of their opaqueness. In general there are two types of carbonaceous matter—one type shows definite plant structure and consists of the more highly carbonized parts of plant cells or bits of woody tissues or other plant tissues; the other shows no plant structure and is of indefinite origin.

Other constituents that are invariably present in all coals are the so-called rodlets or needles. Many are scattered hither and thither through the attritus. Sometimes they are present in such large numbers that they form a considerable part of certain thin laminae. Many of the anthraxylon components, and, conspicuously, many of the mineral charcoal constituents, enclose a smaller or larger number of rodlets that are evidently part of their structure. Most of the tissues remaining in the coal with which rodlets are associated are recognized to be those of plants related to the Medullosae, well-known paleozoic plants allied to the cycads. From this it appears that some of the rodlets, if not all, are the semi-petrified contents of the mucilage canals of Medullosa-like plants. In the original plants these canals were elongated intercellular spaces containing gumming substances.

Can Keep Two Wives

Akron, Ohio, May 2.—An unusual ruling under which Giuseppe Sarniola, an Italian, will be allowed to keep two wives was handed down by federal authorities and Akron police when the man, accompanied by wife No. 1 with a 10-year-old son, and wife No. 2 leading a 3-year-old boy and carrying a baby, appeared at police headquarters.

Sarniola married wife No. 1 in Italy eleven years ago. Later he came to America. Four years ago he sent for her and due to the war heard nothing and presumed she was dead. Then he met wife No. 2, a Pennsylvania widow. She became his common law wife, he said. Two children were born.

Last week Mrs. Sarniola No. 1 and her son reached Akron on an immigrant train. Sarniola hastened to the police with his troubles, wives and children.

After an investigation federal authorities told the man to take his wives home with him. The wives agreed to love each other and live peaceably together. They left police headquarters arm in arm.

"I love them both. They love each other. We all love. I keep them all. They say so," Sarniola said in broken English.

John F. Robinson, retired circus owner, died at his winter home in Miami, Florida, last Saturday. He was 77 years old and is survived by two children John F. Jr., and Mrs. H. F. Stevens, of Cincinnati. Burial was at Cincinnati Monday.

Asheville officers last week rounded a gang of thieves that have, it is thought, committed forty burglaries in the past few months in that city. The gang had a system for carrying on their work.

NOW PASS UP "FIZZ"

Bon Vivants of London Lose Taste for Champagne.

Cafe Proprietors Bewail Dwindling Receipts from Sales of "Wealthy Water."

London.—Proprietors of fashionable west end hotels and restaurants are bewailing the slump in their receipts which they declare has taken place.

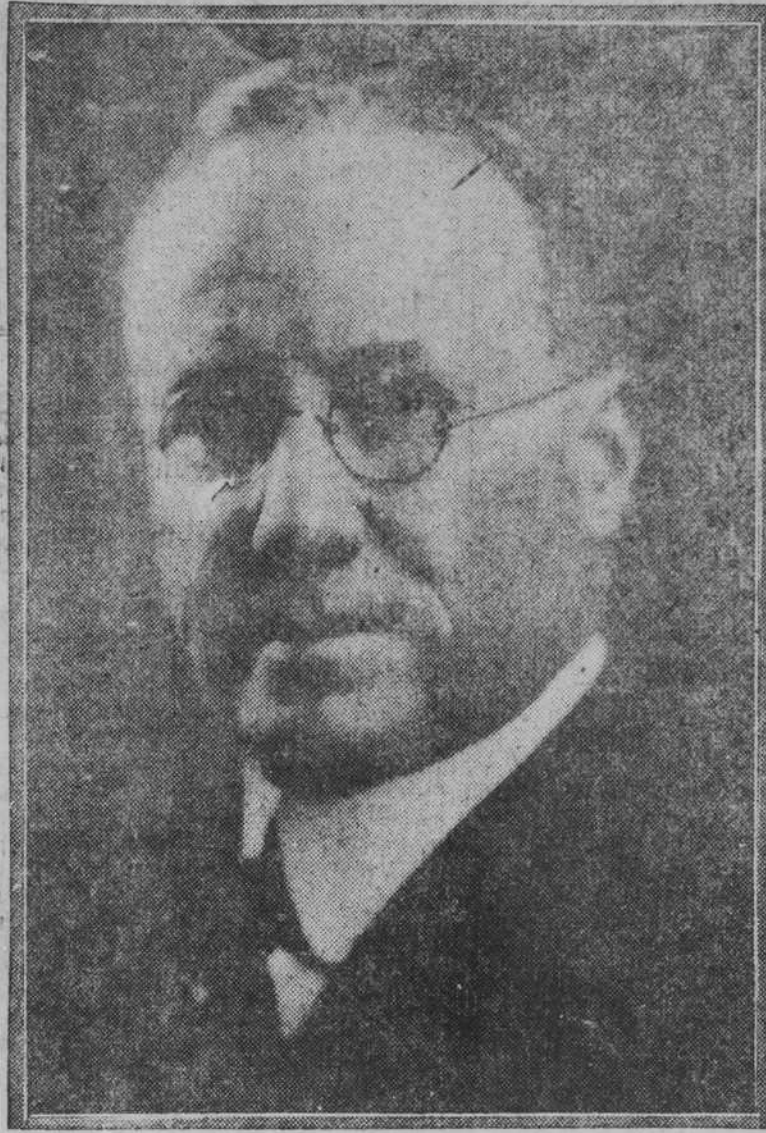
"We have the same number of people dining each night," said the manager of one of the best-known restaurants, "but our receipts are 50 per cent below those of a year ago. The difference," he added, "is chiefly a matter of wine. During the war, and before the war, it was customary for a small party here to have a magnum of champagne. Now they are satisfied with a bottle of Chablis or some other wine which costs much less than champagne."

"Apart from the greater expense," said a famous bon vivant, "it must be admitted that dining out is not as pleasant as it used to be. The restaurants where there used to be refinement and charm, not only in the surroundings but in the people themselves, have been invaded by a new type of diner."

"The conversation and behavior of these new clients have rather vulgarized some of the best restaurants, and the old frequenters prefer to dine at home or at their clubs. Two nights ago I saw a man in what used to be one of the most fashionable and refined of London restaurants dining with his serviette tucked all around his collar. That sort of thing rather spoils the charm of dining out for patrons of the old school."

"As far as the best brands of champagne are concerned, the sale is dead," said the head of a large firm of wine merchants in Pall Mall. "We are selling very little champagne to our private customers, who are instead drinking port, sherry, Marsala and claret. People cannot afford champagne. They could when it could be had at from 8 to 9 shillings a bottle, but what with increased taxes and high prices generally, they naturally fight shy of paying from 16 to 20 shillings for a bottle of champagne, which is now demanded of them."

HON. DAVID H. BLAIR



Mr. Blair is the new Internal Revenue Commissioner appointed by President Harding. He is from Winston-Salem.

STATE NEWS

Durham had a \$30,000 fire the past week when a business block burned out.

Charles White, of Alexander county, was killed by lightning at his home a few days ago.

Bugs have destroyed thousands of tobacco plants in Stokes county and farmers are faced with a shortage of plants.

The King section of Stokes county was visited by a severe rain and hail storm Friday afternoon.

The barn of A. R. Reece at Cool Springs, Iredell county, was destroyed by lightning last Wednesday afternoon.

Carl F. Nissen, member of the firm of Nissen Brothers, of Winston-Salem, died suddenly at his home there Wednesday.

Men's suits made of paper are being exhibited at Statesville and Kinston stores. They retail at \$1.25 up and are said to be of durable texture.

A motion picture film corporation has been organized in Winston-Salem. They are filming a Congo village scene near the city.

The home and school improvement campaign in Iredell county came to close Saturday with a big celebration. Governor Morrison made the address.

Kinston and Statesville merchants are exhibiting paper suits. They are of German manufacture and retail \$1.20 up for coat and pants.

Col. Iredell Meares, of Wilmington, has been appointed special assistant to the attorney general. The job pays \$6,000 a year with all traveling expenses.

Eli Hartman, a well-known farmer of the Advance section of Davie county, was found dead in a small pond near the Yadkin river Friday. He was subject to epilepsy and it is supposed he suffered an attack and fell into the pond while fishing. He was 48 years old and is survived by a wife and two children.

Harding Reviews Fleet

President Harding sailed down the Potomac river to Hampton Roads last Thursday and reviewed the Atlantic division of the American fleet.

The trip down the Potomac on the Mayflower with the band playing and the marine guard at attention when the president boarded the gang plank. The usual presidential salute of twenty-one guns was fired.

The president was accompanied by Mrs. Harding, his military aides and a party of senators.

North Carolina Leads

The largest hosiery mills in world are in North Carolina—Durham Hosiery Mills, Durham.

The largest towel mills in the world are in North Carolina—Cannon Manufacturing Company, Kannapolis.

The largest denim mills in the country are in North Carolina—Proximity Manufacturing Company, Greensboro.

The largest damask mills in the country are in North Carolina—Rosemary Manufacturing Company, Roanoke Rapids.

The greatest underwear factory in the country is in North Carolina—Hanes Knitting Company, Winston-Salem.

Gastonia is the center of the fine combed yarn industry in the south.

North Carolina embraces more mills that dye and finish their own product than any other southern state.

North Carolina leads the entire south in the knitting industry.

There are 513 textile mills in North Carolina, as compared with 180 in South Carolina and 173 in Georgia. North Carolina mills are equipped 5,321,450 spindles, as compared with 5,038,988 in South Carolina and 2,706,022 in Georgia.

Three-fourths of all the new spindles and looms set up in the south in 1920 were set up in North Carolina alone.

Severe Hail Storm

The Eagle Mills section of Iredell county, just over the line from Yadkin, was visited by one of the worst hail storms ever known in that section Wednesday afternoon.

Some of the wheat fields are completely ruined, resembling fresh ploughed ground. Vegetation was beaten into the ground and hundreds of window panes broken out and roofs riddled by the hail stones, some of them being as large as hen eggs. Twenty-four hours after the storm the ground was still covered, in places, with hail as large as marbles.

The hail was accompanied by one of the heaviest rains ever witnessed by the oldest residents and the damage will run into thousands of dollars.

A tornado swept through the Braxton, Miss., section last week. A number of people were killed and many homes demolished.

New York, April 28.—Germany, through the economy and sacrifices of her working people has settled down to real production and is outstripping the United States and allied nations in the fight toward normalcy. C. M. Schwab declared here today in an address before the chamber of commerce of the state of New York.