man states that his samples were collected from a place in the mine where there is no evidence whatever of percolating water in or near the point at which the samples were obtained. There may not have been percolating water present when his samples were taken, but that does not mean that there never could have been any there. In his paper Lipman gives 1,800 feet as the depth at which his samples were secured, whereas a check made by myself of the company's maps showed a vertical depth of less than 500 feet beneath the surface of the ground at this place.

Lipman, by making a study of permeability of anthracite, wisely attempts to offset any mistakes that could be made through failure to examine coal in place or in the laboratory. His permeability study, however, is not at all convincing. He selects two pieces of coal, one of which he treats as he did previous pieces, except that the period of heating in a hot-air oven is much longer than that applied to other pieces of coal in which he found bacteria. This particular piece of coal gave negative results. It is difficult to see why it produced negative results, for there was no reason to suspect that this piece of anthracite did not contain the original ancient bacteria. Of course the longer period of heating may have destroyed them, but this could hardly be the case, for Lipman says in another part of his paper that "it seems as if the longer periods of heating cause the organisms to grow more effectively." Regardless of results, I fail to see the value of this test except in confirming my belief that there are no ancient bacteria in anthracite.

The second piece of coal selected for the permeability tests was treated in the same manner as the first up to the point where it was submerged in a suspension of a pure culture of the coccus derived from the coal previously found to contain bacteria. From this point on the procedure was different. In this case "a few colonies all told, perhaps not more than eight or ten, were found," and Lipman concludes from this that "if the coccus in which the coal sample was submerged had penetrated to any extent at all into the coal each culture made from the crushed sample would have shown heavy growth." The fact that he found some bacteria shows, in my opinion, that either they penetrated the coal or represent original bacteria. If they represent original bacteria some similar growth should have been found in the previous piece which actually gave negative results. One must conclude, therefore, that the control piece either was not treated properly or that the few bacteria found actually penetrated the coal.

Entirely aside from the results obtained in these permeability tests it should be noted that the bacteria in which the coal was suspended were in the vegetative form, which presented much larger particle sizes than the "visible or invisible spores" which, according to Lipman, these organisms are capable of producing. Why can not an invisible spore penetrate an invisible crack or pore? Lipman's statement that "particles as big as a coccus are too large to penetrate the coal, either through crevices or microscopic pores," is also meaningless because he fails to give the dimensions of the cocci, pores or crevices in question.

It is difficult to see how reliable conclusions regarding the presence of ancient bacteria in anthracite can be reached without a thorough study of the history, structure and texture of the coal both in the field and in the laboratory. Long before the shaft is sunk the coal has been subjected to possible contamination through circulating ground-waters. As the shaft is sunk, impure water and air advance with it. Practically every mine is equipped with pumps to keep the water low enough to permit working, and even then flooding is not uncommon. The possibility of securing an uncontaminated piece of coal or rock from a mine is so remote that the whole problem resolves itself into a study of permeability. The student of coal petrography realizes that one piece of coal may be impervious, while another piece from the same bed may contain fractures or laminae which could easily be penetrated by large or small bacteria. A permeability study, then, would be of little value without a knowledge of the texture and structure of the sample used.

The reported finding of bacteria millions of years old is news and as such can do no harm. But, when it begins to appear as a fact, and is used to overthrow well-founded theories on the origin of coal, it is time to ask ourselves whether or not it is true. My object in writing this discussion is to check wild theories and speculations which are being advanced by other writers on the assumption that Lipman really found bacteria of great antiquity in anthracite.

HOMER G. TURNER[4]

THE JURASSIC IN OKLAHOMA

WHILE doing field work in the preparation of a paper on the Pleistocene mammals of Oklahoma, the writer visited the valley of the Cimarron River in Cimarron County, Oklahoma, where he learned that some "big bones" had been uncovered along highway 64, just east of Kenton.

The "big bones" proved to be part of a dinosaur since identified as *Brontosaurus*.

The discovery of this specimen is significant in two respects. It is the first distinctly Jurassic dinosaur

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discovered in the state.[1] It was discovered in territory previously mapped as Morrison,[2] Comanchean or Jurassic. This evidence warrants placing the Purgatoire as the bottom member of the Cretaceous and assigning the bone-producing horizon (Morrison?) to the Jurassic.

The formation where the bones were found lies near the top of the valley wall, and is a dark brown gray-mottled shale which breaks out readily in somewhat cubical blocks. The same formation may be seen exposed in several places on both the east and west walls of West Carrizo Creek Canyon north of Kenton. In this canyon the Purgatoire and Dakota overlie the Morrison.

After some digging the fifth or sixth rib from the left side, two caudal vertebrae and various fragments were uncovered. The two vertebrae are unbroken and only slightly distorted. Excepting the absence of the head, the rib is in perfect condition. When uncovered, it was lying ventral side up and intact.

The work of excavation will be continued under the direction of the department of paleontology of the University of Oklahoma. A detailed study of the area will be made in order to determine the actual extent of the Jurassic in that part of the state. If it seems advisable, a new map showing the outcrops will be prepared.

The writer wishes to thank Mr. R. C. Tate, of Kenton, Oklahoma, who acted as guide while the party was in the area, and who so kindly pointed out the location of the bones.

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PEACH MOSAIC—A NEW VIRUS DISEASE

IN the course of field work for the phony peach eradication campaign, conducted jointly by the U. S. Department of Agriculture and state agencies, inspectors observed in certain peach orchards in Brown and in Callahan Counties, Texas, in July, 1931, characters that suggested the phony disease but that appeared to be different. Fresh specimens from these trees were sent to the writer for identification and study. They gave only negative results with the recently discovered laboratory test for the phony disease, which confirmed the fact that the symptoms were not typical for the latter disease. A striking character of this material was the appearance of the twigs. New growth was abnormal both in number and arrangement of branches, and internodes were in most cases abnormally short.

Inoculation experiments were performed on July 15 and 16, 1931, in which 56 peach nursery trees were grafted or budded with material from the Texas specimens. Although the graft and bud-shield unions were in most cases successful, the inoculated trees failed to develop pathological symptoms during the remainder of 1931. With the beginning of growth in the early spring of 1932, symptoms of a virus disease were at once apparent in the new shoots from all aerial parts of the inoculated trees and in new sucker growth from the roots. Internodes were short, buds in the leaf axils started into growth in profusion, leaf-blades displayed striking mosaic patterns and in many instances were small, narrow, irregular in outline and crinkled. Over 95 per cent. of the inoculated plants developed positive symptoms of a mosaic disease. The fact that inoculum from either the root or the shoot of the suspicious trees in the field communicated the disease indicates that infection is systemic. Experiments have been performed for determining whether the disease may be transmitted by juice, but they have not had time to mature. Experimental plants are isolated in a double-screened (wire and cloth) house and every precaution is taken to prevent accidental dissemination of the disease.

In view of the fact that the above-described characters appeared uniformly in all the successfully inoculated plants, the name *peach mosaic* is suggested for the new disease. Not only is peach mosaic interesting in that it constitutes a new member of the group of peach virus diseases, but it is thought to be the first positive, infectious mosaic to be recorded for the peach. Yellows, little peach, rosette and phony disease cause the development of a variety of pathological characters in twig and leaf, but none of them produce mosaic patterns in the leaves.

Only a few trees are known to be infected with peach mosaic at the present time. Forty-two cases were located by inspectors, scattered over three blocks of trees in an orchard in Brown County, and a few cases were seen in an orchard in Callahan County. The supposedly sparse population and limited distribution of peach mosaic would appear to present an ideal case for thorough survey supported by prompt eradication.

A detailed, illustrated description of the disease and the experiments that proved its infectious nature will appear in a forthcoming publication.

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A CORRECTION

I HAVE just received from Mr. Hoyt S. Gale, of Los Angeles, a statement of facts which enables me to make two small corrections in my note, "The

[1] Pierce Larkin, *Jour. of Geol.*, v. 18, 1910.
[2] E. P. Rothrock, *O. G. S. Bull.*, 34, 1925.