OHIO GEOLOGICAL SURVEY,

Columbus, O., July 3d 1882.

Dr. J. W. Dawson.

Dear Sir.

I trust that I need not apologize for addressing you though personally unknown to you. I have lately fallen upon some interesting facts in the line of paleobotany in which I need help that you perhaps are able to give.

I have discovered a source and I think the chief source of the bituminous matter in the Devonian and Carboniferous black shales of Ohio – viz, the Huron, Cleveland and Berea (or Waverly Black Shale) Shales of our Geological Reports. All of them contain large quantities of vegetable spores, (macro-spores apparently) resinous in appearance, quite inflammable, some most of them slowly dissolving in ether and alcohol combined. There are various sorts, but by far the most common forms are those that range from 1/100 to 1/200 of an inch in long diameter. They are circular in outline, with a convex side & a concave one often, the latter having a relief form resembling that of a horse track. These forms crowd the shales in great numbers. They can be easily separated from the shale and examined by themselves. They show well in cut sections of the rock, the transverse sections showing yellow bars or hoops and the sections parallel to the bedding giving yellow circles.

Sporangites
Ohio
Orton

Aside from these forms are two others that are very well characterized. One of them is $\frac{1}{50}$ to $\frac{1}{60}$ of an inch in long diameter, is amber brown in color, burns readily, dissolves slowly (some of them at least) in alcohol and ether, leaving a spongy cellular tissue. A third form is of the same size as the last, but is multilocular in structure 18 to 30 lobes constituting it. Of the last, I have but a few forms.

I send on in this letter a few fragments of the shale for your examination. I w^d send you cut sections if I could transmit them safely.

Huron
or Kettle
Penn

The small fragment, No. 1 comes from 1000 ft. below the surface in Northern Ohio. It lies just below the horizon of the Penn^a Oil sands and furnishes I think an adequate and natural explanation of the oils and gas

No. 2, is from the shale of Central Ohio. This is from Newberry's Cleveland Shale, as shown here in Columbus.

No. 3, is a chip of weathered shale from the same locality.

No. 4. contains one or two of the large forms.

I want to know whether you see any analogy to living forms of vegetation in these fossils? Lesquereux says, "Spores certainly", but stops here. Newberry says "Spores" but goes no further.

With great respect very truly, yours
Edward Orton.