

## THE EASTWARD EXTENSION OF THE SWEETLAND CREEK SHALE IN ILLINOIS.

By J. A. UDDEN,

University of Texas, Petrolia, Tex.

In 1898 I had occasion to examine and describe a deposit of shale which occurs under the Pennsylvanian, in Muscatine County in Iowa. It overlies unconformably the Cedar Valley limestone in this locality and its entire thickness is only about forty feet. It is a shale that is quite distinct from any shale in the coal measures. It is more evenly developed than the latter, and single layers in it, only a few inches thick, may be traced for several miles. The upper part of the shale has a grayish green color. The lower part is dark, and it contains some strata of dolomitic limestones at the base. These basal layers contain teeth of *Ptyctodus calceolus*, often in abundance. The lower half of the formation as here developed also contains other fossils, such as:

*Lingula*, sp. undet.  
*L.* cf. *melie* Hall.  
*Lingula*, cf. *nuda* Hall.  
*Lingula subspatulata* M. and W. (?)  
*Spathiocaris emersoni* Clarke.  
*Solenocaris strigata* Meek.  
*Ptyctodus calceolus* M. and W.  
*Rhynchodus*, cf. *excavatus* Newb.  
*Synthetodus*.  
*Gasteropods*.

There is also present in considerable abundance the fossil known as *Sporangites huronense*. This fossil is supposed to be a spore of some paleozoic tree, and consists of brown circular discs nearly too small to be seen by the unaided eye. In some layers this is present in such abundance as to give the shale a brownish color. The spores consist of a bituminous substance, and when submitted to a distilling heat the shale gives out a considerable percentage of

gas and oil. The best exposures are in Sweetland Creek, and hence the name, the Sweetland Creek Shale.

Under the Kinderhook limestone at Burlington in Iowa, there are some 300 feet of shale overlying the Devonian limestone. In this locality this shale has usually been referred to the Kinderhook group. Whether these two shales are different formations, one overlying the other unconformably, or whether they belong to the same formation, is at present an undetermined question. The lower part of the shale at Muscatine was referred to the Chemung by Prof. Hall long ago, and its fish and crustacean fauna support this view.

During the progress of some examinations of samples of well drillings in the north and central parts of Illinois, I have found a shale resembling the Sweetland Creek shale in several wells. The identification of this shale with the Sweetland Creek is believed to be sufficiently certain. It is based upon the similarity in texture and general appearance of both shales, on the presence in both of *Sporangites huronense*, in the presence of certain fossil fragments resembling denticles of annelids, and in the presence in some well samples of a *Lingula*. The formation varies in thickness from less than a hundred to 300 feet, owing no doubt to an unconformity. The observations made on the shale in several of the wells are as follows:

#### GALESBURG CITY WELL NUMBER 3.

In the Galesburg city well number 3, made in 1906, there was a light gray shale underlying the coal measures at a depth below the surface of 245 feet. With this shale were some pieces of white chert, evidently from a remnant of the Burlington limestone above. Some more shale was taken from 330 feet below the surface. This was labeled "brown shale." It contained *Sporangites* in abundance, well preserved. When crushed by the drill it no doubt gave a brown color to the shale, that otherwise is gray. The next sample below this was from 380 feet below the surface and consisted of a soft shaly limestone, probably Devonian. The shale at this place may be a hundred feet thick.

#### THE OLD MONMOUTH CITY WELL.

In the well drilled in 1887 at 410 North Sixth Street, in the city of Monmouth, a greenish gray shale, no doubt equivalent to the Kinderhook shale at Burlington, in Iowa, extends from 168 to 299 feet below the surface. Under this there is a dark gray shale

extending down to 427 feet below the surface. From this bed nineteen samples were taken about five feet apart, and in more than half the number of these samples *Sporangites huronense* is present. Some annelid denticles were also noted in one of these samples, taken 313 feet below the surface. The two shales together have a thickness of 261 feet.

## THE HENRY CITY WELL.

From the old city well in Henry, made in 1886, in Marshall County, one sample of drillings was taken representing the strata from 325 to 402 feet below the surface. A part of this sample consists of shale belonging to the coal measures, which in this well extend down from 130 to 325 feet below the surface. But the greater part of the sample consists of a faintly brownish gray shale, in which *Sporangites huronense* occurs in abundance. The next sample taken below this represents the ground from 402 to 426 feet below the surface. This is mostly white, finely granular limestone, probably Devonian.

## THE SCHUYLER OIL AND GAS COMPANY WELL.

This well was made in 1909 on a farm belonging to Mr. W. B. Manlove, in Birmingham township in Schuyler County, about four miles southeast of the town of Plymouth. The Mississippian limestones in this boring continue down to 240 feet below the surface and are underlain by 450 feet of shale. The description of the samples from 246 to 683 feet below the surface is as below:

Light shale, with fragments of limestone.....	246
Light blue shale, with much pyrites in small crystals. Fragments of calcareous limestone frequent.....	280
Light blue shale, with pyrites and calcareous fragments.....	292
Light, greenish blue shale, with pyrites.....	295
Light, greenish blue shale, with only infrequent cystal of pyrites....	302
Light, greenish blue shale. No pyrites noted.....	302
Light, greenish blue shale.....	310
Light, greenish blue shale.....	320
Greenish gray shale, with poorly preserved specimens of <i>Sporangites</i> , occurring sparsely .....	330
Greenish gray shale, with <i>Sporangites</i> .....	340
Greenish gray shale, with poorly preserved specimens of <i>Sporangites</i> ..	345
Gray shale, faintly micaceous, with <i>Sporangites</i> .....	355
Gray shale, with abundant <i>Sporangites</i> and occasional crystals of pyrites	365
Gray shale, with <i>Sporangites</i> poorly preserved.....	400
Light gray shale, micaceous, with comparatively thick specimens of <i>Sporangites</i> , and shapeless fragments of resinous material which appear to be shreds of <i>Sporangites</i> .....	415
Shale, almost black, showing reflections of minute scales of mica. A highly bituminous rock which burns for a few moments after it has been thoroughly ignited. On the split surfaces of some large fragments several small specimens of <i>Lingula</i> were noted, about one millimeter in diameter. The distance from the umbo to the	

- ventral margin of the valves was slightly greater than the transverse measure. Faint lines radiated from the umbo and distinct concentric lines of growth are seen. Irregular minute tubercles appear on the outer part of the valves. This black shale appears as a yellow translucent mass in transmitted light under the lens... 511
- A highly bituminous limestone, most of which effervesces briskly with acid. Some effervesces hardly at all. Some of the sample is crystalline calcite, and some bituminous fragments burn, when ignited, for a few seconds. The label on the sample was blurred, 5?1, but its highly bituminous character makes it probable that it is from about the same depth as the previous sample. Near (?)..... 511
- Green clay shale, not effervescing in acid..... 600
- Greenish gray shale of very fine plastic texture, effervescing slightly with acid, containing a valve of an *Estheria?* Label indistinct; 680 or 683..... 683

Under this there was 270 feet of limestone, probably partly Devonian and partly of Trenton age.

THE PEORIA GLEN OAK PARK WELL.

This well shows 150 feet of drift, 250 feet of coal measures, 125 feet of Mississippian limestone, and under this 195 feet of shale, of which at least the lower 70 feet are to be correlated with the Sweetland Creek shale. This rests on calcareous limestone believed to be of Devonian age. The samples examined were as below:

	Depth from below from	Surface to
Greenish gray shale with fragments of sponge spicules. Some fragments of a bluish translucent rock show a network of imbedded spicules (Kinderhook?) .....	525	590
Gray, slightly micaceous shale with crystals of pyrite and indistinct specimens of <i>Sporangites huronense</i> .....	590	650
Like the preceding, with frequent specimens of <i>Sporangites huronense</i> .....	650	720

THE JUNCTION MINING COMPANY DRILL BORE NEAR SPRINGFIELD.

A core from a diamond drill coal test sunk 1,500 feet below the surface near Springfield shows the presence of 231 feet of shale, underlying a reddish limestone recognized as the Kinderhook shaly limestone. The uppermost 97 feet of this shale contains some fine oolitic rock and has been referred by Prof. J. E. Savage to the Kinderhook. The lower 133 feet is no doubt to be correlated with the Sweetland Creek shale. It contains *Sporangites huronense* and also a *Lingula*. It is separated from an underlying limestone by a sharply defined limit, and the uneven upper surface of this limestone bears a striking resemblance to the unconformable upper surface of the Cedar Valley limestone, in Muscatine County in Iowa, including the presence of worn fragments of indistinct fish teeth.

It is believed by the writer that the Sweetland Creek shale is a western extension of the "Black shale" in Ohio and that it is identical with the Devonian shale at Milwaukee. From these scattered wells, in which it has been identified by the examination of drill cuttings, it seems likely to be continuous under the Mississippian in the central part of the state, and it was once probably a continuous deposit, laid down in a sea extending from Ohio to Iowa. Its uniform development and its limited thickness indicate, as Professor Dana has stated, nearly uniform conditions of level over a great extent of the surface of the interior of this continent.