ART. XVIII.—*Note on the geological position of Petroleum Reservoirs in Southern Kentucky and in Tennessee; by Prof. J. M. SAFFORD.*

THE object of the following note is to point out briefly the geological position of the petroleum reservoirs in Southern Kentucky and in Tennessee, so far as they have been met with within the field of my observations. I hope, in a future article, to give a summary of all ascertained facts with reference to the mineral oils of this region.

The accompanying general section will serve to illustrate the topographical and geological features of the region under consideration. The line of section extends from the Cumberland mountain, or table-land, in Putnam county, Tennessee, through Overton county, in a direction a little west of north, to Burksville, Kentucky, and thence to Glasgow. The entire distance is

about seventy miles. The region traversed by this line is a plateau, from 800 to 1000 feet above the sea, out of the nearly horizontal strata of which the larger streams have eroded valleys from 800 to 500 feet deep.

The following are the formations represented in the section:

7. *Coal-measures*, 400 ft., edge of table-land.
 6. *Mountain Limestone*,¹ about 550 ft. thick in Putnam county; mostly limestones.

5. *Siliceous group*; the "knobstones" of Kentucky. From 800 to 500 feet thick, including the Lithostrotion beds as its upper part.

4. *Black slate*, Devonian and Genesee, having a maximum thickness of about 60 feet.

3. *Upper Silurian* mostly or wholly, from 100 to 150 feet thick; mostly a series of limestones, some of which are impure, approaching fine sandstone or shale in character. The existence of these strata in the region of Glasgow is mainly *inferred* from the fact that they are seen in certain sections to the northeast and southwest of this point. They are, however, comparatively unimportant, and thin out southeastward and disappear.

2. *Nashville group*, Mr. Dana's Hudson period; blue fossiliferous limestones with some calcareous shales, 500 feet.

1. *Trenton limestones*, at the base of the section.

It may be remarked, in passing, that one of the most striking features of this section is the almost entire absence of the Upper Silurian and Devonian formations. In the Tennessee and Cumberland river portions, the Upper Silurian beds are wholly wanting, while the Devonian series is represented by nothing more than the thin Black Slate—a fact pointed out by me many years ago.

I have represented in the section the geological places of what we may call typical petroleum wells by the short heavy vertical lines. We will notice them in descending order.

1st. *In the Mountain Limestone*. The heavy line at *a* in the upper part of this formation indicates simply the geological level of the "Beaty oil well." Its geographical and topographical positions are very different. The well is located in Kentucky on the Big South Fork of Cumberland river, and near the Ten-

¹ The awkward term *subcarboniferous* ought to be dropped. Silurian rocks are subcarboniferous.

nessee line. The valley of the stream is, at the well, narrow, and is deeply set in the Cumberland table-land; it cuts through the Coal-measures and into the top part of the Mountain limestone, exposing about 50 feet of the latter. The Mountain limestone is therefore much depressed at this point. The well is sunk near the river, and is less than 200 feet deep. It was bored, about 1825, for salt water. At its greatest depth, a reservoir of oil was struck, from which so much petroleum flowed as to lead to the abandonment of the boring as a salt well. For several years after petroleum was gathered at this point for medicinal purposes. How much petroleum issued from this boring it is now impossible to tell. I give it simply as a good example of an oil reservoir actually tapped in the Mountain limestone.

2d. *In the Siliceous group.* There are several examples in this formation of reservoirs reached by boring. At *b* in the section the geological (not geographical) place of the "Porter well" in Allen county, Kentucky, is represented. This well is located on Bay's Fork of Big Barren, on a line between Scottsville and Bowling Green, and about seven miles from the former place and eighteen from the latter. This reservoir was tapped, some time in January of this year, at the moderate depth of 55 feet. It yielded for a number of days, by pumping, about 400 barrels of oil and strong brine per day, half of which was oil. At the time of my visit, Feb. 13th, it had produced altogether about 1000 barrels of petroleum, but was not then doing well.

In the southern part of Overton county, Tennessee, on Spring creek, is another example. Here a reservoir was struck which yielded heavy oil, but how much I am not informed.

3d. *In the Black Slate.* On Boyd's creek, near Glasgow, Kentucky, is a group of half a dozen wells or more. Their position is shown by the heavy vertical lines at *c*. One or two of these met with oil in the Black Slate.

4th. *In the Upper Silurian.* All of the Boyd's creek wells start in the Siliceous group, most of them pass through the Black Slate and terminate in this group. Taking all the wells, they vary in depth from 60 to 250 feet, averaging about 130 feet. So it was at least at the time of my visit. One of them was, and may be now, a flowing well, having yielded for many months nearly or quite 30 barrels of oil per day. One or two of these borings may reach the next group of limestones below. In fact practically, and possibly in reality, the rocks may be united with the Nashville group.

5th. *In the Nashville group.* This group has furnished the most and the largest reservoirs. The geological and topographical place of a number of borings, which have tapped oil reservoirs, on the Cumberland and Obey rivers, and on their tributaries, both in Kentucky and Tennessee, is shown by the heavy

short lines at *d, d*. The old "American oil well" near Burksville, originally bored for salt water, may be taken as an example. This, from top to bottom, is within the Nashville group. Its mouth is not far from 40 feet below the level of the Black Slate. At the depth of about 175 feet this boring tapped an oil reservoir, from which flowed out, at a minimum estimate, 50,000 barrels of oil. The recently bored Crocus creek well, which has yielded up to this time not far from 30,000 barrels, is another example. Other examples might be given, but these are sufficient. A great number of wells will be sunk in this formation during the present year.

6th. *In the Trenton limestones.* Some boring has been done in this series, but as yet no repositories of any note have been discovered, at least in Tennessee.

Nashville, Tenn., March 10th, 1866.