

lighter and more volatile constituents of petroleum, while the heavier portions may have been arrested below. For some little distance around, the shales show oil on their surface, and there is no doubt much more gas and oil exuding through them than this one little spring would indicate.

The amount of oil collecting on this and a couple of other similar pools is very small; it took a day of careful skimming and syphoning to collect a pint bottle full. In collecting the samples it was noted that, after it was in the bottle, there was a clear portion underneath the whitish-green and more viscous "scum;" this was at first thought to be water, but it was found that paper absorbed it quickly and that it was inflammable. The scum has, on standing in the bottle, become clear amber colour, with the colourless portion below. A careful analysis will have to be made of these two products to determine their character.

The two springs described are evidently at the ridge of the same anticlinal fold and are undoubtedly from the same area of accumulation, the one resulting probably from a fractional distillation only. If the oil should have been generated, as Dr. Dawson suggests, "in consequence of heat at considerable depth in the earth's crust, acting upon the fixed hydrocarbons contained in the rocks of that series" (Cretaceous coal-bearing rocks), then the oil so generated would rise until it met some impervious barrier of overlying rock formation, and if such rock should be in the form of an inverted basin (an anticlinal), it thus would collect and retain the oil.

Assuming the theory advanced as to the origin of the oil to be correct, and that it has been so generated in quantity, then there is a fair probability of there being underneath this "spring" a body of oil, because the overlying rocks are practically impervious, and the position in which they lie, an unbroken anticlinal fold, is such as would serve as a trap or reservoir in which it would be retained under pressure. The fact of the seepage being small does not argue against there being a large body of oil below, for if the seepage was large it would, in the ages past, have drained off the oil and there would be now no accumulation. As far as the disposition of the surface strata may serve as a guide, they would seem to indicate ideal conditions for such an accumulation, should the oil have been so generated.

If, by reason of an overthrust fault, the Cretaceous rocks do underlie at this point the surface formation of Cambrian age, then these Cretaceous rocks must be at a very great depth, quite beyond all practical reach, so deep as to be affected by the interior heat of the earth so as to generate the oil in question. Oil so generated would rise until arrested by the barrier mentioned, and the question as to how far below the present surface this barrier may be it is impossible to determine, but, judging from the rock exposures seen to the eastward, the depth must be very considerable. Whether the depth of such oil-retaining barrier is beyond economical reach only very extensive boring operations can determine, although a detailed geo-

logical survey and sectional plan of the whole formation from this point well into Alberta might serve as a guide.

As to whether oil in quantity exists under this inverted basin of rock, there is little data upon which to base an opinion. Oil has been found, however, over a considerable area of country, as it exudes at the two creeks mentioned and to the S. E., some 12 miles more or less, at Kintla Lake, in Montana, while on the same line of strike it has been found in small quantities. In Montana boring has been done to a considerable extent, it is reported to depths of over 1,200 feet, but without finding any quantity of oil.

About five miles over the Kish-e-neh-na summit into Alberta oil is found. There it occurs seeping through the gravel-wash of the bedrock of the creek, evidently coming out at some point higher up the valley. A few gallons a day have been collected there by washing the gravel in a sluice and collecting the oil from the surface of the water with cloths. Boring has been done here. One bore-hole was put down last year for over 1,200 feet, and it is reported that some oil was found at 1,120 feet down, but the quantity was small, and there is no flow nor has there been any production, although oil was seen standing in the "tubing" of the well and in the pit around the drill-hole.

A second drill-hole was being sunk this last summer by a Vancouver syndicate about half a mile further down same creek, and this hole was down over 1,300 feet without getting oil at that depth; this work is still in progress, while two or three additional bore-holes are being put in further down the valley, near the foot-hills.

These operations in Alberta are being carried on at a point very near the junction of the Cretaceous rocks and the older rocks which occur over the British Columbia summit, that is near the line of the supposed overthrust fault.

ECONOMIC VALUES OF OIL DISCOVERIES.—As to the economic importance of the oil in this district, it is very difficult at present from the data available to predict. The conditions may be summarized as follows: The geological formation, as exposed in the hills and on the surface, is lying comparatively regular and flat. There is no local evidence of serious disturbance, so that from local observation it might be taken for granted that this great mass of conformably bedded deposit was "in place" in its geological scale. This formation has been classed as of Cambrian age by two successive directors of the Geological Survey of Canada. Oil has never been found *produced* in a geological formation as old as the Cambrian, nor do the rocks here exposed admit of the probability of their being the source of oil. Under anything but very extraordinary conditions, these surface geological conditions would seem to render it impossible for oil to occur in this section, but the stubborn fact remains that it is found there. It is, as Dr. Dawson very appropriately calls it, a "somewhat anomalous occurrence of petroleum."

In accounting for this fact, the explanation given