

gas, but the manager does not expect to meet with oil for a considerable distance yet. He states that the bore had gone through conglomerate gravel and sandstone.

The surface of the country in this locality is covered with a thick deposit of agglomerate breccia, having ferruginous seams running through it. This breccia is to a certain extent porous, and capable of holding small quantities of oil, such as would be deposited from a condensation of the gas coming up through the seams and fissures in the rocks; but at about 200 yards further southward of the places where boring operations are being carried on there is a belt of country of a much older formation in which the conical hills known as the Sugar Loaves are situate. These appear to be portion of a dyke running back inland, and it is on the northern side of this dyke petroleum is likely to be found. The place where indications of petroleum exist is in a belt of country not apparently more than 500 yards wide. The oil is found on the ocean-beach at low water, on the north side of the breakwater, where the gas is found bubbling up, bringing with it small quantities of oil; also, when carrying on dredging operations for the foundations of the breakwater, small quantities of petroleum were seen all the way out until the end of the breakwater was reached, and small quantities can always be seen on the surface of the water, when the sea is smooth, between Mikotahi and Mutaroa Islands.

During my visit to this district some three years ago, when examining the country where indications of petroleum were found inland, on the north side of the dyke previously referred to, Mr. Kyngdon, a settler about a mile and a half in a direct line back from the ocean-beach towards Mount Egmont, stated that he sunk a well some 60ft. deep, and found the water so impregnated with petroleum that it was totally unfit for domestic purposes; he therefore filled up the well again. The surface of the ground where this well was sunk is about 380ft. above sea-level. Travelling further inland, over what is known as Burton's Hill, there is a flat valley or basin about 630ft. above sea-level, and in this valley several of the settlers state that they have sunk wells where the water tasted so strongly of kerosene that they could not use it. There is no reason to doubt the existence of small quantities of petroleum having been met with in these wells, and this goes in a great measure to show that it will yet be found over a large area. The only question remaining to be solved is whether it will be found in sufficient quantities to pay for working. A sample of the oil was shown me that came out of the deep bore which the former company put down. It is of very dark colour, of high density, and a viscid appearance, resembling thin syrup. Comparing this oil with the description of the oils found in other parts of the world, it is likely to be found in a limestone formation, but the oil found near the surface is merely a secondary deposit, either by the condensation of gas, or by hydrostatic pressure, and the formation carrying the oil will be found at a very considerable depth. The mere fact of finding petroleum oozing out in small quantities on the surface is no criterion that it will be found in payable quantities by boring to a great depth; indeed, this indication rather favours an opposite view—namely, that it is not likely that large accumulations of petroleum will be found without an approximately impervious roof, such as thick beds of close shale on top of the stratum forming the oil-reservoir.

Small quantities of petroleum have been for centuries known to exist on the western shores of the Red Sea, at the mouth of the Gulf of Suez. There is a mountain at this point named by the Arabs, Jebel Zeit, or Oil Mountain. The oil is found in surface-holes, and by digging anywhere along the foreshore, as soon as the surface of the water is reached, the strata, which are usually of a soft character, are found to be black and oily, and, after a time, each excavation fills with salt water, having a film of petroleum on the top. Boring has been carried on in this locality without finding any stratum containing a reservoir of oil. The opinion of some of those having large experience in oil-boring, is that, where there are surface-indications, it will be found in most cases that the conditions necessary to the storage of oil are wanting, and that therefore, though at one time oil might have existed in large quantities, or the conditions for its production been present, the oil stored or produced has been lost.

The question as to the origin of petroleum is one that cannot be satisfactorily answered. Different theories have been advanced, but so far scientists have not agreed on any definite theory, so that it may be said at the present day to remain a hypothesis. If we were certain of its origin, and the conditions in which petroleum was formed, we should be better able to consider the probabilities of finding it. So many theories are propounded as to its origin that it may be interesting to those who reside in a district where indications of petroleum are found for me to state some of those theories.

In 1866 Berthelot, the French chemist, propounded a theory that the alkaline metals—viz., potassium and sodium—exist in the interior of the earth in a free or uncombined state, and necessarily at a high temperature, and if water carrying in solution carbonic acid should find access to these metals chemical action takes place, resulting in the formation of a series of hydrocarbon compounds. In such a theory as this the process of the oil formation would be deeply seated, and continuous constant supplies would be always forthcoming.

Another theory was advanced by a Russian chemist—Mendeljeff—in 1877, which attracted a good deal of attention amongst scientists. This was that the interior of the earth contained large masses of metallic iron and also metallic carbides—compounds of carbon and metals—all at a high temperature. The contact of water under these conditions and with these bodies would, in his view, generate metallic oxides and hydrocarbons. Mendeljeff accordingly held that petroleum is never of an organic origin, but is purely a product of chemical affinity.

Again, Dr. T. Sterry Hunt, Professors J. P. Lesley, J. S. Newberry, J. C. White, J. D. Whitney, and also S. F. Peckham hold different views, which are more easily reconcilable with the conditions in which petroleum is found. They all believe it to be of organic origin, but differ in the way in which it was formed and deposited. Dr. T. Sterry Hunt lays great force on the view that petroleum originates in and is mainly derived from limestones. In speaking of the oil-fields of Canada, he says,—