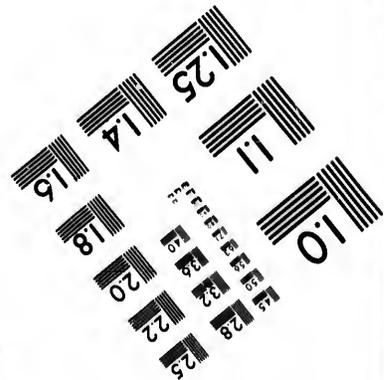
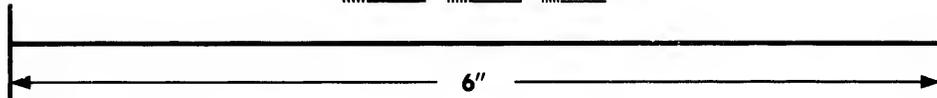
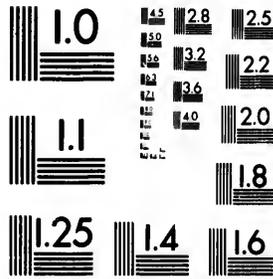


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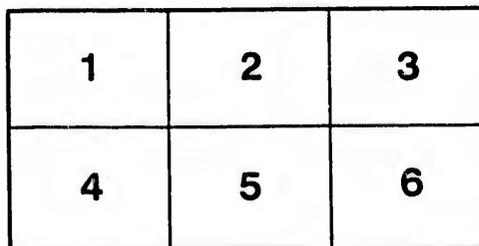
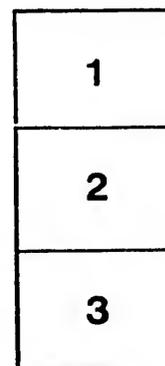
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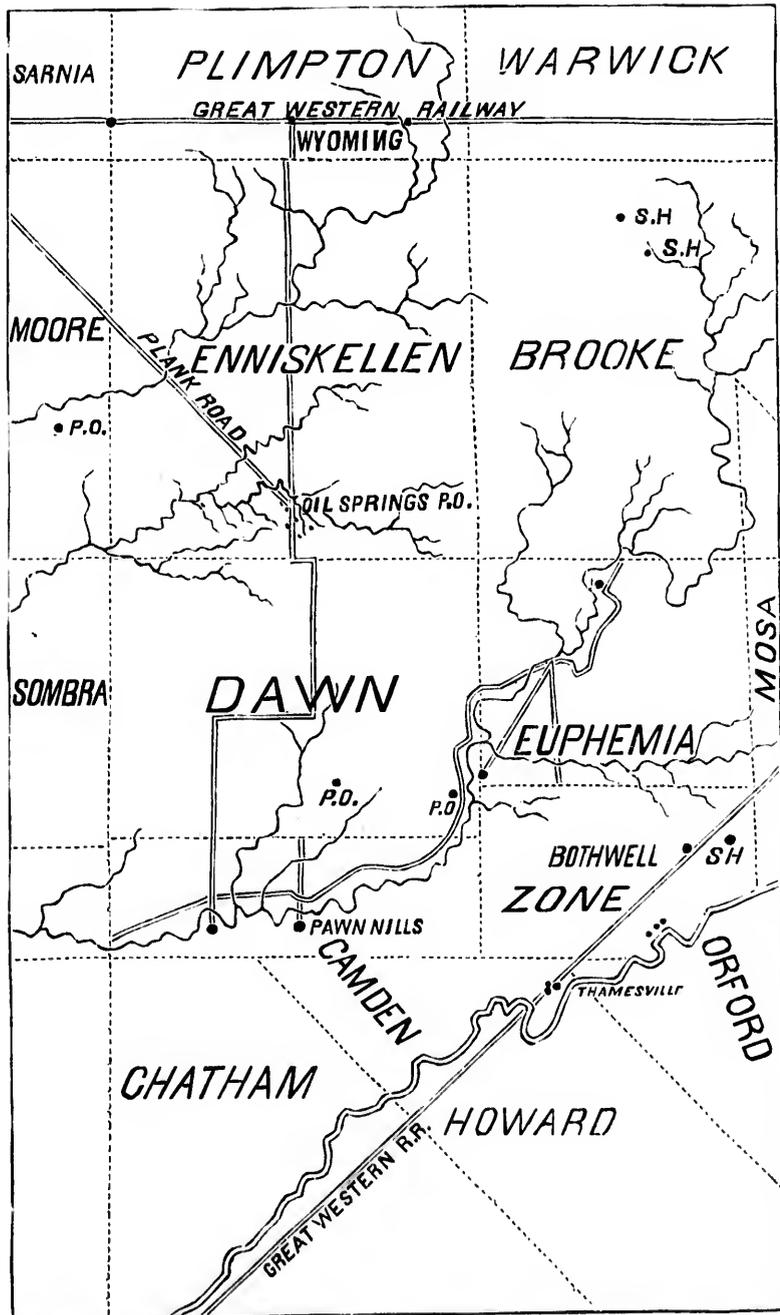
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MAP OF THE CANADA OIL DISTRICTS.

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OIL DISTRICTS  
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COMPILED FROM OFFICIAL AND OTHER RELIABLE SOURCES.

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GENERAL AGENTS FOR THE PUBLISHER,  
THE AMERICAN NEWS COMPANY,  
119 and 121 Nassau St.,  
NEW YORK.

1865.

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J. FAHNESTOCK, ENGRAVER & PRINTER,  
The Cheapest in the World,  
13 AND 15 PARK ROW, NEW YORK.

The compiler is indebted to the Honorable A. T. Galt, Minister of Finance, Sir W. E. Logan and Dr. T. Sterry Hunt, of the Geological Bureau, Hon. R. S. M. Bouchette, Commissioner of Customs, T. D. Ledyard, Esq., Toronto, and several other gentlemen, for valuable assistance kindly rendered him toward the compiling of this pamphlet, for which favors, they will please accept his hearty thanks. He has freely consulted a very valuable little work called "Petroleum and its Products" by A. Norman Tate, F. C. S., of Liverpool, from which much valuable information has been deduced.

JOHN F. TYRRELL.

## INTRODUCTORY.

The enormous demand for Petroleum for actual consumption, as an illuminating agent, both at home and abroad, and the new uses to which it is every day being adapted, render it one of the most important products of the American Continent.

Although Petroleum is no novelty in the world—it having been in use for many centuries prior to the Christian Era—the American region is the only one, ancient or modern, that has ever attained any great degree of developement.

The State of Pennsylvania has, undoubtedly, the greatest reputation as an oil producing territory, of any place ever yet heard of; but it does not necessarily follow that Pennsylvania has the richest, or most valuable soil, for the production of the oleaginous treasure. The cause of her having been the principal producing State, is owing, simply to the fact, that *her resources have been well developed.*

Those who carefully investigate the matter will see that there are many places which are destined, not only to equal, but *surpass* her in both the quantity and quality of oil produced.

That territory upon which it is our province to treat, is fast enlisting the attention of the American people, and its many advantages and superiorities, are as rapidly becoming admitted facts.

### THE OIL DISTRICTS OF CANADA.

The grounds upon which it claims precedence over Pennsylvania, are briefly these:—

*First*—The oil has greater illuminating power.

*Second*—A greater quantity of refined is procured from a given quantity of crude.

*Third*—The oil is found much nearer the surface

*Fourth*—The cost of labor is less.

*Fifth*—There is no tax or duty whatever on either crude or refined.

*Sixth*—Barrels &c. can be had much cheaper, and are made on the spot.

*Seventh*—The facility for transportation is greater.

*Eighth*—The fact that in Pennsylvania only four out of every ten wells are successful; in Canada, eight out of every ten.

**THE**  
**OIL DISTRICTS OF CANADA.**

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The great oil district of Canada lies in the narrow strip of land dividing Lakes Erie and Huron, in the extreme south-western part of Western Canada. The township of Enniskillen, in the county of Lambton, is the chief centre of attraction, but oil is known to exist all through that locality. The village of Oil Springs (which is the principal village of Enniskillen, and the nucleus of the wells,) is in the southern part of the township, twelve miles distant by a plank road from Wyoming Station, on the Great Western Railway, and about seventy miles from Detroit in the State of Michigan. There is also direct communication by another plank road with the town of Sarnia, distance eighteen miles, on the river St. Clair, where vessels

have been laden with Petroleum for Liverpool direct.

The means of locomotion have been wonderfully improved within the past year or two, and the cost of transportation is now not more than one-sixth of what it was in 1862.

By two Acts of the Provincial Parliament,—26 Vic.: Caps XV and XVIII,—the Great Western Railway, and the Oil Springs Road Company, or the Grand Trunk Railway, as their representatives, are authorized to connect their lines of Railway, from such points as they may determine, with the village of Oil Springs. This connection has not yet been made, but it no doubt will be, during the coming summer, as the rapidly growing increase in supply renders it a mercantile necessity.

The township of Enniskillen is intersected by numerous small streams—the tributaries of Black and Bear Creeks. Black Creek was known to be coated with a black, oily matter, (from which it derives its name) which was used by the squatters for lubricating and other purposes.

As it floats on the surface of the creek, and is carried down gradually by the stream, the most beautiful and diverse hues appear. The Canada Company employed for some time, a chemist, in the hope that he would be able to procure dyes. He did so to some extent; and, a very fine and beautiful blue, which he produced, is exhibited at the refinery. But he unfortunately died, and his invention was lost with him.

In 1857 Mr. W. M. Williams, of Hamilton, C. W., conceived the idea of distilling and refining a tough, tarry sort of bitumen, collected in large ponds, covering several acres, which are now known as the Gum Beds. The principal difficulty which he encountered was the lack of clean water, and in search of the desired fluid he sank a well, which, to his amazement, and I may safely add, disgust, yielded this same bitumen, only in a more limpid state. This was the first oil well found in Canada.

When the fact became known, many adventurers repaired to the spot, and commenced digging for oil. At this time *surface* oil only was found, the rock not yet having been penetrated. Unfortunately for the fair fame of the region, and also for the parties themselves, the class of persons who undertook its developement, have, until lately, been of a class wholly incompetent to the task. Little or no capital was invested, and consequently the rudest means only were employed.

We are told by Sir William Logan that the districts yielding oil in Western Canada, were made known by natural oil springs, small quantities of Petroleum being found floating on the surface of the water, or, as in Enniskillen forming, by its drying up, beds of a tarry bitumen. Where these indications were found, wells were sunk through the clay some fifty or sixty feet deep, where a bed of gravel was generally met with, which yielded oil; but these surface wells have never yielded as large a quantity or as good a quality of oil as has since

been obtained by boring through the older stratified rocks beneath. In 1861 when these borings were first made, the presence of oil, which is now indicated in various ways, usually by the escape of gas, or the appearance of oil upon the cable attached to the tools, showed itself by the rush of oil to the surface, constituting what are called flowing wells.— The supply from these wells was enormous. In some cases as many as two thousand barrels being taken from one well in the course of twenty-four hours. Valuable as a good oil bed is now, it was something to 'strike ile' in those days, when the fortunate possessor of the well was only concerned about how he could prevent its waste, and secure the proceeds of his valuable discovery. In 1862 there were no less than thirty-three of those flowing wells at this point, yielding variously from fifty to a thousand barrels a day, and going up, as we have said, in the case of one well, to the extent of two thousand barrels in twenty-four hours.

In many instances persons went there and commenced digging for oil, working laboriously with high hopes of immediate wealth, but their little supply of funds becoming exhausted, have been compelled to abandon their well, and with it, their fondest expectations. A few days after, others, scarce more fortunate than themselves, would become possessors of the half sunk shaft, and by the expenditure of only a few hours labor strike a vein of oil; yielding (even with their rude means of pumping) from ten to twenty barrels per day. The de-

mand for Petroleum at that time was so very limited, and the cost of transportation from the wells so great, that it was at best, only a moderately paying commodity.

The means employed for getting the oil to Wyoming, was sometimes a sort of miniature canal, consisting of an ordinary ditch filled with slush or mud, in which the barrel was placed and towed by hand or otherwise, for a distance of twelve miles to the railway station. The roads were then in such a frightful condition that it was an utter impossibility to move an empty wagon, not to speak of one laden with oil.

On the 16th of January 1862, the first flowing well was struck. It is known as the Shaw well, and was sunk by a man whose name it bears.

We find the following in the *Toronto Globe* shortly after the discovery of this well:—

“One of the elements of romance at all times has been the sudden elevation of individuals from penury to wealth and social consideration. Having settled to our own satisfaction that romance is not dead, we plunge *in medias res*—that is to say, into a certain deep well near Victoria, on lot 18, in the Second Concession of the Township of Enniskillen. In that well a certain John Shaw centered all his hopes and expectations for many long months.—Painfully did he dig, painfully drill, painfully pump; expending first cash and then credit, and afterwards his own muscles on a wearisome task. Not a sign of oil did he find. His neighbors' wells

were overflowing; he alone had received no share of the petroleum stream. The middle of last January found him a ruined, hopeless man, jeered at by his neighbors, his pockets empty, his clothes in tatters,—as our neighbors across the line say—dead broke. Report says, that on a certain day in January, he found himself unable to pursue his work. Not to put too fine a point on it, his boots had utterly given out, and to enable him to paddle about in the wet and cold, a new pair was absolutely necessary. In fear and trembling, as we may suppose, John Shaw proceeded to a neighboring store, and having no money asked—sad necessity—for a pair of boots on credit. Report sayeth not whether the refusal was kindly administered in the spirit of self-defense which traders must sometimes fall back upon, or whether it was the purse-pride of the rich man looking down on his humble neighbor; but, certain it was, that the boots were refused to John Shaw, and he returned to his well a sadder man than he left it, protesting that he would work no longer than that day, if success did not crown his efforts, he would cast the mud of Enniskillen from his old boots and depart to more congenial climes.

Moodily he took up his drill, and sternly struck it into the rock. Hark! what is that? A sound of liquid from the depths below; hissing and gurgling as it escapes from the confinement of centuries.— Does it cease? No, see it comes, growing in volume every moment. It fills the pipe, it fills the well; still it comes. Five minutes; ten minutes; in fifteen

minutes it has reached the top of the well; it overflows: it fills a tank; it overflows that; vain are all attempts to check its career; resistless it pours in a mighty tide down the declivity into Black Creek, and is borne away by the waters to the St. Clair and the lakes. Who shall attempt to describe the feelings of John Shaw at that moment? We shall not, for we do not know how he showed them. The by-standers have not recorded whether he wept, or whether he took off his hat and shouted, hooray! Anything might be excused at such a moment. We suspect that, like a philosophic Yankee, he went to work to "save the ile." But the report of the flowing well spread like wildfire through the settlement, and "John Shaw's territory" became the centre of attraction. In the morning he had been "Old Shaw;" if he had spelt his name with a "P." before it, they could not have described him more contemptuously. Now, he was Mr. Shaw."

"This well extended through fifty feet of clay from the surface, and one hundred and fifty-eight feet through the rock, in all two hundred and eight feet from the surface. The iron pipes used to convey the oil from the rock in the flowing wells vary from one and a half to two and a half inches in diameter. Shaw's well had one and a half inch pipe."

The Black & Mathison well at the east Gum Beds was another very extraordinary well, and yielded immense quantities, throwing the oil high

in the air, (marks of which are still to be seen on the trees in the vicinity) and covering over twenty acres of land with oil.\* This well was also grossly mismanaged.

In 1862, oil sold at the wells for twenty-five cents per barrel, and, indeed, it is said to have changed hands at as low a price as ten cents. Now, it is in demand at from four to five dollars the barrel, in Gold.

The average depth of the surface wells was from fifty to eighty feet; their product is a very heavy oil, used chiefly for lubricating purposes. The rock wells vary from two hundred to three hundred feet, and produce a superior oil for illuminating purposes. Sir W. E. Logan in his "Geology of Canada," p. 386, says:—"The oil springs of Enniskillen, which are supposed to have their source in the Corniferous limestone, rise through the Hamilton shales, in which numerous wells and borings have been sunk to various depths. These, meeting with fissures connected probably with anticlinals, bring to the surface large quantities of Petroleum, often accompanied by inflammable gas and saline waters."

When this oil was first put upon the market, it was refined by persons, who, like those engaged in

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\* During the years 1861 to 1864 there was exported from the Province two millions, two hundred and ninety-two thousand, seven hundred and fifty-eight gallons of Petroleum, at a Customs valuation of three hundred and fifty-three thousand, eight hundred and fifty five dollars, or a trifle over fifteen cents per gallon. Of this, fifteen-twentieths, (or three-fourths) went to Great Britain; three-twentieths to the United States and maritime B. N. A. Provinces; and two-twentieths to other foreign countries.

producing the crude, were unqualified to treat it properly. The consequence was that it was but partially refined, and still more partially deodorized. A natural prejudice was created against Canada Oil, which existed for a time, but as soon as it became properly refined, it was found to yield a more brilliant light than Pennsylvania oil, and to be in many respects, of a much superior quality.

As an instance of prejudice against the crude, we may mention the fact, that some time ago, the Canada Rock Oil Co. shipped a cargo of oil to England. Upon its arrival at Liverpool great difference of opinion was expressed, as to whether it was Pennsylvania or Canada oil. Buyers were unable to determine; some declaring it Pennsylvania and others a mixture of the two; but all agreed that it was not pure Canadian. At last the consignees wrote to the owners, stating that if it was really Pennsylvanian they could get for it a certain price, but if Canadian, it must be sold for five cents per gallon less.

A correspondent of the *Globe*, in a late letter from Oil Springs, in speaking of the demand for oil, says: "One firm alone here have orders for 20,000 barrels, but they are unable to execute it, the supply being too limited, and I am told that orders for 200,000 barrels in addition have been received.—The production may and will increase, but it can scarcely overtake the demand, now that coal oil has got into such general use."

There are European orders alone, yet unfilled,

for 600,000 bbls., or three times the amount mentioned in this extract.

The *Montreal Trade Review* sums up the relative cost of freight to New York, the estimate being based on Gold at 150, as follows:

CANADA.		PENNSYLVANIA.	
From Wells to Railway,	20	} Taxes at Well, per bbl	66
Rail and Canal to New York,	1 30		From Wells to Railway,
		Rail to New York,	1 50
			<hr/>
			2 82
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	1 52		
In favor of Canada,	1 32		

The item of freight from Pennsylvania is, if anything, under-estimated, as the facilities of transportation are very limited. On the other hand the item of freight from Canada is a little over some estimates.

The cost of transportation from wells to Railway, given above at twenty cents, is evidently intended for points most convenient to the stations. The rate from Oil Springs to Wyoming is about thirty-five cents per barrel.

There are now in active operation in the vicinity of Oil Springs about sixty-five rock wells, with daily additions to their number.

Many of these wells are not yet supplied with steam engines, and these are worked by the ingenious contrivance of a long lever, attached by a rope to a pedel board, upon which a man, or in some cases two men, stand and enjoy themselves, at what in their younger days they would doubtless have known by the appellation of "teeter."

In referring to this subject, Professor Cutting of

Rochester University, says :—" In all the district, I saw but two derricks which American oil producers deem fit for use, and both of these were of recent construction. Much of the boring and pumping have been by spring-poles and the use of the foot, and I saw a very good engine pumping twenty barrels per day, the post in which the walking-beam worked swaying transversely to the beam, and wasting power which, economized with a little labor, would have added probably twenty dollars per day to the product of the well. It was time that operations were suspended, amid such manifestations, for a better and more productive agency. This explanation of idle wells and small production, which I had received in answer to general inquiries, was subsequently confirmed by my knowledge of particular cases."

A correspondent of the *Detroit Free Press* in a late letter to that journal, says :—" The yield of the smaller wells in operation might be greatly augmented if the engines on the ground possessed more capacity. The owners are, however, taking steps to supply this deficiency by importing the requisite steam power. Some of the expected machinery has already arrived, for I saw four engines at Wyoming Station, waiting transportation to the springs, and they tell me more are on the way.

As now wells are constantly being discovered (two had been found last week, with good yields) the number of oil speculators in this locality is very large, and increases constantly by every train that

arrives. Land is selling rapidly and finds ready purchasers among speculators, who, strange to say, are all Americans. Most of the land in the township has already been taken up, and of what is left none can be bought for less than fifty dollars per acre, while some ranges as high as five thousand."

Until within the past year there has been no proper, vigorous, or systematic development in Canada. It was not until American capital and enterprise were introduced, that the rude appliances originally used for boring gave place to substantial derricks and serviceable machinery. The Wyoming Rock Oil Company, of New York, was the pioneer in the path of systematic development, and through its example and influence a new era of prosperity has dawned upon the oil districts of Canada. This company, managed by gentlemen of large wealth and high commercial standing is pushing forward its work with energy and business system, thus furnishing an example worthy of imitation by all who are interested in Canadian oil development. They own a large and valuable tract of oil territory including the celebrated Gum Beds and have now, in all, over sixty wells, beside others going down.

The *Oil Springs Chronicle* says:—"Since our last report there have been as many as six good wells obtained. Mr. Beckwith has struck a splendid show of oil at 350 feet. Mr. Merchant, at a depth of 400 feet, has found a new kind of oil from

what has hitherto been found. It is much lighter and more limpid than any yet obtained. But the best thing that has yet been discovered since the flowing wells, is what is now called the Campbell Well. It was struck on Thursday last, and gave very good indications of being a flowing well. A pump was at once put in, and in about six hours fifty barrels of good oil was secured. This has created considerable excitement, and the fortunate owners are receiving the congratulations of all who rejoice in the prosperity of their neighbors. Still there is reward for labor."

Two new wells, in lot 19, in the Second Concession, are just reported; one, said to have pumped, with a span of horses, at the rate of two hundred barrels a day, and another, (which is 180 feet in the rock) two hundred and fifty barrels, with a small engine, but both are, no doubt over-estimates.

A joint Stock Company was recently formed, for the purpose of sinking a test well, in order to ascertain the oil-producing merits of the lower strata.

This well is now down over 950 feet, and so soon as a depth of 1000 feet is attained, its producing powers will be tested. It is, however, unjust to regard this as the "test well" of the district, when it actually tests only the particular spot on which it is sunk.

It is impossible to ascertain the value of any tract of land at a single boring. For instance, a well was sunk to a fair depth, with a two inch bore

in the rock, and only a small supply of oil was found. The owners not being satisfied bored it over again with a three inch drill, thereby enlarging the hole only half an inch on each side, and struck a large vein of oil, which the two-inch boring had failed to tap. So, in sinking this well—they may barely miss one of these large veins, and they may not; but under any circumstances it in itself is no criterion of the resources of the district.

During the progress of the work, two large flows of oil have been struck, which, of themselves will give a large yield.

“The average cost of sinking a well, including both the surface and the bore, may be nearly estimated at \$2 per foot. That is, if all goes on prosperously without break or other hindrance. The price of the engine and the machinery for pumping, tanks, &c., is not included in this estimate.

In one of the lowest contracts taken here, it was agreed to sink a surface well to the rock, to crib it, and to bore a four and one-half inch hole in the rock, to a depth of 100 feet, for \$300. It is the opinion of most that the contractors will not come out winners.

An eight-horse portable steam engine can be purchased for \$550; a twelve-horse for \$840 or \$850.

The trees at the Oil Springs are all of hardwood. There is no pine to be found. Fuel costs nothing beyond the price of cutting it, but pi e is expensive. Common lumber is worth at the Springs \$14 a thousand. The best kind, used for making tanks

and barrels, is worth \$24. When the roads get better, and owing to the recent high winds and the hot sun they are rapidly getting better, the rates will come down.

First-class barrels are worth \$2. Some may be bought for \$1 50, but they are not considered reliable.

An active laboring man is worth \$1 a day.—  
Carpenters get \$1 50.

It may be expected that some of the original land-holders here have made money. This is not the case. When oil was first discovered, land was bought up for an "old song." Property now worth \$1000 an acre, was bought for \$5 or \$6.—  
About the year 1860, or a little earlier, 200 acres, a portion of it cleared, in what is now one of the richest parts of Oil Springs, was offered for a team of horses and was refused."

One of the greatest, and most undoubted, superiorities of Enniskillen, is the fact of its being so much more prolific in oil than Pennsylvania, or any other of the American districts. Of this fact we have the most abundant proofs. No one who has visited Venango county, can have failed to notice, the many barren wells, each one representing a considerable amount of invested capital, which must be placed to the debit of profit and loss.

In Pennsylvania, only certain localities, contiguous to the creeks and bluffs, are considered as oil-productive; only four wells in every ten, produce oil at all, and not one out of twenty pay the work-

ing expenses. The largest producing well in Pennsylvania, notwithstanding the fabulous reports daily in circulation, yields only four hundred and fifty barrels per day, instead of sixteen hundred, as is commonly understood. There are estimated to be more wells producing less than four barrels per day, than there are producing *over* that quantity.

In Canada, the land is nearly a uniform level, and experience has proved that the rock underlying the whole of this district, is thoroughly impregnated with oil.

A correspondent of the *Toronto Globe*, in a recent letter, speaking of the southern part of Enniskillen, says:—"The fact has, however, been established, that within these limits it is almost impossible to bore a deep hole without finding oil.

Professor S. S. Cutting, whom we have previously quoted, alludes to this subject, as follows:—

"The larger number of wells in the district are near the creek; but the valuable wells scattered here and there on the level, with no manifest signs of preference of one spot over another, demonstrate that the district is saturated with oil, and that it is likely to be found, seek it where you will. At the back door of the hotel at which I stopped, they undertook to dig a well for water, and to their great consternation it yielded oil. Indeed, wells of water are quite useless to those who have no relish for the taste and smell of Petroleum. The success of the oil wells over the whole surface hitherto tested, and this general character of the earth's

surface, demonstrate that for a long time at least, the yield of oil must be unailing."

Another correspondent, in writing very lately, from Oil Springs, says;—"Even the hotel-keeper of the "Exchange" is obliged to mix his tea and coffee, his gin and molasses, with filtered rain water in default of anything better. He dug a hole in his yard, hoping, foolish man, to get the "aqua pura," but found oil instead. Whenever he gets short of money he has only to pull the lid from off his well, dip down his bucket, draw forth his oil, pay what he owes and keep the rest."

The celebrated Sanborn property; which has always been regarded as immensely valuable, is now in possession of the Enniskillen Petroleum and Refining Company, of New York, which ranks among the more prominent of the Canadian organizations. It is composed of 146 acres of lot 18, in the Second Concession, and 18 acres of lot 16, in the Third Concession, upon which are over forty wells of all sizes, which yield when pumped. This Company also own lot 18, in the Eighth Concession—200 acres, which has not yet been bored, and a first class refinery with the appurtenances, on lot 18, in the Second Concession. The famous Bradley well, which, till lately, has not been used since it stopped flowing in 1862, is also in their possession; it now pumps at the rate of about thirty barrels per day.

The village of Petrolia, on Bear Creek, a few

miles north of Oil Springs, is the centre of another batch of wells.

A correspondent alludes to this village, as follows:—"I yesterday visited Petrolia, the village lying between the Oil Springs and Wyoming, about eleven and a half miles to the north of the former, on the plank road. Petrolia was always a better looking place than Oil Springs, cleaner, and possessing some of the elements of the picturesque.—The woods in the immediate neighborhood are less tangled, there is but little swamp, and the land is rolling. A good many acres round about are under cultivation, comfortable looking farm houses stock the landscape, and being nearer the Great Western Railway than Oil Springs, it has always possessed greater facilities for transportation to Wyoming. Petrolia suffered like its rival from the effects of flowing wells and the low price of oil. Most of the wells have been abandoned for two years, and the refinery has been shut off. The people, however, have now awakened, all is activity, and the coming summer will see a very large business done at the village."

The principal company engaged in developing this locality is the Crescent Petroleum Association of New York.

Oil has been found in almost all quarters of Enniskillen, and in the neighboring Townships of Dawn, Brooke, Moore, Sombra, and Plympton; while the village of Bothwell, in Zone, to the south

east of Oil Springs, is the Centre of another lot of wells, fast coming into favor.

The *Toronto Globe*, in a lengthy editorial, in speaking of the listlessness with which many of the Canadian people have, thus far, regarded the development of what is proving to be, an immense source of wealth, says :—"They have seen gigantic stock companies started, whose shares have been sought with avidity in the American markets.— These companies have large capital, very many wells are being sunk, many more will be commenced as soon as the machinery necessary can be procured, and the work is being pushed on with vigor and energy. The success that has already been met with, the paying wells already in operation, the indications of oil invariably opened, almost eliminate doubt from the calculation.

There are now engaged in development, at least twenty-five companies. In addition to those already named, we may mention the following :

The Dawn Petroleum Company, New York.

The St. Clair Petroleum Company, Philadelphia.

The Canada Rock Oil Company, Montreal.

The Little Falls Oil Company.

The Black Creek Oil Company.

The Great Western Consolidated Company.

The Victoria Petroleum Company.

The Albion Petroleum Company, Newark, N. J.

The Lancaster Oil Company, Erie, Pa.

The Campbell Rock Oil Company, Michigan.

The Huron Oil Company.

The Wyoming Petroleum Company.

The Hartford Oil Company.

The Petroleum Mining Company.

The International Oil Company.

The German (Bothwell) Company.

The Lima Company.

The Thames Petroleum Company, Montreal.

The New York and Bothwell Oil Company.

The International Petroleum Company, Wisconsin.

The Kent Oil Company, New Bedford, Mass.

The International Petroleum Company, Michigan.

Although the flowing wells of 1862 have either stopped flowing, or entirely ceased to yield, (which by many is attributed to the fact that they were not properly managed when oil was first struck) there has been no perceptible diminution in the supply of the pumping wells. On the contrary in more than one instance, such wells are known to have gradually increased their supply. Some of these pumping wells have been in constant use since they were first sunk, and others have lain idle from the slackness of the market, but all are now in active operation. In both instances the supply has held good.

This is another and not unimportant point, in which Canada has the advantage of Pennsylvania, and one which augurs well for the future.

One gentleman in advancing a theory whereby to account for the sudden stoppage of the flowing wells and the appearance of water instead, writes: "There were altogether upwards of twenty of these

wells. The greater part were sunk to a depth of about 150 feet in the rock; the remainder to a depth of about 110 feet. Say 20 of the wells at the 150 feet flowed continuously from July, 1862, to the beginning of February, 1863. Then they stopped, and salt water made its appearance. The first to perpetrate this sorry joke was the one farthest east, which we will call No. 1. The rest followed in rotation. But the remainder of the wells—those at the average depth of 110 feet—continued to flow for fully six weeks longer. The theory is this—that somebody sunk to the east of No. 1 a well, and in doing so tapped a vein of water which had previously been blocked up; and by means of the bore, brought it into communication with the oil veins. The greater weight of the water—and, aside from its weight, perhaps its greater pressure—kept back the oil. The flowing wells, at the average depth of 150 feet, failing successfully as the water forced its way westward, and those on the higher level shared the same fate a few weeks further on. If this idea be correct, it results that the oil reservoir has not been exhausted. In connection with this fact may be mentioned this other, that flowing wells from which only a few barrels had been taken failed equally with those which were allowed to discharge hundreds of thousands of gallons into the creek. The theory may be correct or not; the remedy is still wanting.”

## CANADA COMPARED WITH PENNSYLVANIA,

The relative gravity of the oils is—

Pennsylvania . . . . .	42° to 45°
Canada . . . . .	32° to 38°

The estimated per centage of refined from crude is—

Pennsylvania . . . . .	48 per cent.
Canada . . . . .	80 “

The *New York Times*, in speaking of Caspian C. Sparks' experience in Pennsylvania and West Virginia, quoting from Prof. Cutting's report, says:

“He regards Canada as superior to either, and as superior to Pennsylvania for these reasons: First, the product is more certain. In Pennsylvania he estimates four out of ten wells to be successful; in Canada, eight out of ten. Second, in Pennsylvania the wells are required to be of nearly or quite double the depth, or six hundred feet, while in Canada the deepest are but three hundred. In addition to this he regards the Canada oil as of a superior quality—for illuminating purposes the same quantity lasting twice as long. Fuel in Pennsylvania is costly, in Canada costs the cutting. In Pennsylvania labor is scarce and expensive, in Canada abundant and cheap. Access to the New York market, where petroleum may be sold in bond, without duty, is less costly than from Pennsylvania.”

In addition to the very great advantages enumerated in this extract, we may add that much of the rock through which the drill passes is of a soft and

shale like nature, and consequently much less difficult to bore. The writer has frequently seen this shale so soft and so saturated with oil, that globules of the oil could be extracted simply by its pressure between the finger and thumb.

There is no tax or duty whatever on Canada oil, while in the United States the Government tax on crude is one dollar per barrel, and on refined, twenty cents per gallon.

Canada oil, which at first seemed to cling so tenaciously to its disagreeable smell, is now proved to be easily deodorized.

Prof. Cutting, in speaking of it, says: "This rock oil is less dense and less offensive, but of such density as to make it of special value, and capable of easy deodorization."

A. Norman Tate, F. C. S., a noted English chemist, says: "I am engaged at the present time in investigating a process by which the worst specimens of Canadian oil may be deodorized, at a cost not exceeding one penny per gallon, and it is probable that, by a little alteration, this may be reduced to less than one farthing per gallon."

The following is an analysis of Canadian Petroleum by Dr. Sheridan Muspratt. One hundred parts of Enniskillen oil yielded in distillation:

Light colored Naptha, sp. gr. 0.794.....	20
Heavy yellow Naptha, sp. gr. 0.837.....	50
Lubricating Oil, rich in paraffin.....	22
Tar.....	5
Charcoal.....	1
Loss.....	2

## A FEW FACTS ABOUT PETROLEUM.

Petroleum is known to have been in use for various purposes at least four thousand years ago.

The earliest evidence of its existence is found among the ruins of Ninevah, in the building of which city an asphaltic mortar was employed—the asphaltic being obtained by the evaporation of Petroleum. The springs of Is, about one hundred and twenty miles above Babylon, attracted the attention of Alexander, of Trajan, and of Julian; they are in existence at the present time, and the Petroleum procured from them is largely used for illuminating purposes.

A substance obtained from Petroleum was used by the Egyptians in embalming their dead.

In one of the Ionian Islands there is a spring which has yielded Petroleum for more than two thousand years. Herodotus speaks of the wells of Zacynthus—the modern Zante; and Plutarch describes a sea on fire, or lake of burning Petroleum, near Ecbatana.

The perpetual fires that burnt at pagan shrines are supposed to have been caused by springs of mineral oil inflamed at the surface.

Pliny and Dioscorides mention the Petroleum of Agrigentum, in Sicily, which was used in lamps, under the name of "Sicilian Oil."

The springs Rakou, in Persia, in the vicinity of the Caspian Sea, are widely celebrated, and have yielded immense quantities of oil,

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The Petroleum springs of Rangoon, on the banks of the Irawaddi, in the Burman Empire, are said to have been known and worked for ages, and are at the present time some of the most powerful and copious springs yet discovered.

There is a lake of bitumen at the head of La Brac harbor, in the Island of Trinidad, which is three miles in circumference.

It is said that wood steeped in Petroleum is proof against decay for many years.

The French Government appointed a committee to examine the capabilities of Petroleum for the generation of steam; and it has been proved that in seventeen minutes 4.25 lbs. of Petroleum will raise steam to a given pressure that it requires 9.35 lbs. of the best coal to effect in thirty minutes.

Gas manufactured from Petroleum gives a light variously estimated at from four to six times more luminous than coal gas. The Stephenson House, at St. Catharines, C. W., has long been lit with Petroleum gas, made under what is known as Thompson's Patent. There are one hundred and eighty burners, and the average cost per night was, in 1862, only eighty-six cents.

#### THE GUM BEDS.

The Gum Beds are situated on lots sixteen and eighteen, in the first and second concessions of Enniskillen. They cover several acres, and are composed of a hard, black bitumen, which is no other than Petroleum which, in time past, has found its

way to the surface, and, through the action of the air, and consequent evaporation of the Naptha, has become solidified. Similar indications are to be observed in several places throughout the township, especially to the east of Oil Springs.

We are told that this bitumen is also found in India, in France, and in the sand rock of Albania. In the Birmese Empire there is a mountain, where several hundred pits have been sunk for the purpose of collecting Petroleum, which has long been used as an illuminating agent.

The liquid Petroleum has been found in China, Carpathian Hills, Neufchatel, Persia, Dalmatia, the Hartz, and on the shores of the Caspian Sea, where it oozes through the soil in the form of a vapor gas, and is led through earthen pipes for illuminating the neighboring towns and cities. The existence of Petroleum in the Dead Sea has been known from time immemorial. The bituminous matter is found in the centre of the sea in a liquid state; but upon the banks it is in hard, compact masses, which probably have been formed by the evaporation of the liquid.

A light oil is found in a spring near Amiana, in Parma, and is used for illuminating the city of Genoa.

The bitumen in the Gum Beds of Enniskillen, as has been previously mentioned, first attracted attention as being capable of being reduced to an illuminating oil. It was in carrying out this idea, that the great deposits of liquid Petroleum were

first made known. When the sun plays upon the Gum beds, the bitumen melts, and is collected in large holes or pits, previously prepared to receive it.

It was in the vicinity of these Gum beds that the first wells were sunk, owing to the then prevailing idea, that oil was more likely to be found there than in other places. This notion has since been clearly disproved, as some of the best wells are in spots, showing, previous to their existence, no extraordinary indications of oil. From one of these beds, the entire carcass of a deer has lately been exhumed. The medicinal properties of this oil are said to be very great.

“Petroleum of various shades, from the green of the Barbadoes springs to the pale yellow of Amiana, has been long known to possess certain medicinal properties. The rock oil of Barbadoes, or as it has been vulgarly but improperly called, Barbadoes-tar, has been found a useful stimulant to torpid bowels, promoting in such a temperament the alvine discharge. The Petroleum found at Gabian, near Beziers, in France, has been called Olean Gabianum. It has been given as an excitant expectorant; and mixed with tincture assafoetida, in tapeworm.

The chief medicinal value of Petroleum, however, is as an external remedy in a variety of cutaneous affections

The bitumen used by the ancient Babylonians to cement the sun-dried bricks, of which their colossal

structures are mostly composed, is admitted by the ablest antiquarians, to be Petroleum, chiefly obtained from the fountains of Is, the modern Hit, on the right bank of the Euphrates, which flow copiously to this day.

#### BOTHWELL.

This village is in the Township of Zone, in the County of Lambton, and on the Detroit branch of the Great Western Railway. About four years ago, when oil was first discovered on Black Creek, it was also found to exist on the bank of the Thames, a little south of Bothwell. Parties without capital set to work to develop the territory, but little was demonstrated, beyond the fact that large quantities of oil existed. Owing to the very low price, and exceedingly limited demand for the oil, operations were almost entirely suspended, until the development of the Enniskillen district, and with it the surrounding country, of which Bothwell forms a part, fell into the hands of wealthy and enterprising Americans.

Within the past few months, many good wells have been found, and several companies are engaged in sinking more, with good prospects of large yields.

“The mode of sinking for oil here is somewhat different from that practised in Enniskillen. There the distance from the surface to the rock is seldom as much as 80 feet. Here, out of about twelve wells, the smallest depth is 106 feet, the greatest

180 feet. At first, attempts were made to get to the rock in the regular method, but this was found to be impossible. The depth required, together with the quicksands, rendered it impracticable. A very great deal of money was spent in vain attempts at "cribbing" ere the effort was given up. A very successful method has been adopted in its place.— A large hole is first bored in the ground to a distance of a few feet, say 12 or 15, and 10 inches in diameter. Into it an iron pipe, like a heavy stove-pipe, is forced. The bore is then proceeded with, but at a reduced diameter, equal to that of the interior of the pipe. When a depth of a few more feet has been attained, a smaller pipe is slipped down the interior of the first pipe into the hole, and so on until the rock is reached. By the time that is done, the diameter of the bore will have decreased to an average of five and one-half inches. Wooden piping is frequently used instead of iron. The surface bore is put down by hand power, and very rough machinery, involving a great waste of labor, is used.

The vicinity of Bothwell wears a lively and business like appearance, and, in addition to the many wells already being sunk, the commencement of several more is deferred only till the arrival of the necessary machinery, which is on the way. One well, owned by a Mr. Lick, averages a yield of fifty barrels per day.

Although there are many good wells here, the land has never been in as great favor as Eunniskil-

men, for while there it would be difficult to purchase on Black Creek for less than \$750 per acre, here the highest price paid was \$200, and that for the most desirable lots.

A Scotch company have already six wells—two yielding and four under way—and intend to start six more immediately. These wells will be sunk to the north of the Longwood road. They are waiting only for the machinery.

The following is a copy of the log of one of their wells:

Clay loam .....	16 feet.
Blue clay .....	20 "
Gravel and boulders.....	4 "
Hard pan.....	15 "
Water gravel.....	2 "
Dry sand .....	34 "
Water gravel.....	18 "
Clay.....	40 "
Limestone rock.....	2 "
Water gravel.....	9 "
Limestone .....	6 "
Soapstone.....	23 "
Limestone.....	8 "
Soapstone.....	2 "
Limestone.....	91 "

After this, to the depth of 425 feet, limestone mixed with sand was met with.

One of the principal organizations engaged in developing this district is the Petroleum Land Company of New York, who are doing much to unearth the hidden treasures. They have leased the following lands:

14 acres, lot 29	river range,	Mosa.
60 " " 19	"	Zone.
67 " " 18	"	Zone.
27 " " 10	"	Zone.
50 " " 17	16th con.	Orford.
45 " " 16	"	"
70 " " 18	"	"
20 " " 17	15th con.	"
20 " " 19	"	"
100 " " 20	14th con.	"
100 " " 24	"	"
80 " " 24	"	"
100 " " 25	"	"
100 " " 1	1st con.	Aldborough.
100 " " 2	river range,	Mosa.

They own, in fee, 1200 acres in Orford, comprising lots 13, 14, 15, 18, 19, 20, 21 and 22 in the 11th concession; lots 14 and 20 in the 12th concession; lot 24 in the 13th concession; lot 19 in the 15th concession; lot 11 in the 10th concession; lot 20 in the 8th concession; lot 7 in the 7th concession Zone, and 2200 acres besides, chiefly in Aldborough.

A large number of wells are being sunk on their property, which is some of the most valuable territory in this locality.

Such a spirit of enterprise and implicit confidence is everywhere displayed, that ere long, South-western Canada will, no doubt, rank among the greatest producing Oil districts in the world.

In the middle of the river Thames there is a jet of oil rising through the stream, which breaks upon the surface, and as the oil spreads upon the clear

water, it presents, when illuminated by the sun, a beautiful sight, emitting all the colors of the rainbow.

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### **Oil Regions of Canada : Its Geological Features.**

DEDUCED FROM SIR W. E. LOGANS' REPORTS.

[ We copy the following article from a new and very elaborate map of the Oil Districts of Canada, just published by J. Ellis, Toronto, C. W. ]

#### **CORNIFEROUS FORMATION.**

The name Corniferous formation is, by the New York Geologists, restricted to the upper division, which has in that state, a thickness of about seventy feet, and with the additions of the Local Schoharie grit, makes up what they have described as the Upper Helderberg Group.

In Western Canada we find that many of the fossils of the Corniferous limestone pass up from the Oriskany sandstone and the intermediate Onandaga limestone; we, therefore, unite the two limestones under the name of the Corniferous formation. The surface occupied by this formation in Western Canada is, probably, between 6000 and 7000 square miles. To the eastward, this formation is bounded by the out-crop already assigned to the underlying strata, the limits of which, in many parts, have yet been but imperfectly traced. The whole of the Province to the west and south of this line belong to the Corniferous formation, with the exception of a belt of higher Devonian rocks,

which crosses the country from Lake Huron to Lake Erie, and divides the region into two eras. These newer strata occupy a saddle-shaped depression on the great Cincinnati Anticline, which runs nearly east and west through the peninsula, while the course of this depression in synclinal is nearly north and south from Plympton, on Lake Huron, to Oxford, on Lake Erie. The belt of higher rocks has a breadth of only about twenty-five miles on the anticline, between the Thames and Sydenham rivers; but, on either side, it spreads to the north-east and south-west along the shores of the two lakes.

At Port Dover, and near the village of Jarvis, the Corniferous limestone formation is highly bituminous. Petroleum is found in many places, filling the pores of the corals. The *Petroleum Springs*, which rise from this formation in Tilsonburgh, probably have their origin in such bituminous beds, and other springs of the same character, which issue in *Enniskillen*, from strata above. The Corniferous, very probably, ascend through these newer rocks, from the same formation. Some of these springs seem to be on a line with the anticline, which runs through the western Peninsula. The oil being lighter than water, and permeating within the strata, naturally rises to the highest part, which is the crown of the anticline. It will be observed that the positions of these anticline forms in Western Canada thus become a matter of economic importance. The general course of the main anticline

can be readily traced by means of the distribution of the formations.

It would appear that the crown of the arch runs in a gentle curve from the western extremity of Lake Ontario, by Woodstock, in the neighborhood of which the base of the Corniferous formation folds over it. Proceeding thence by the Thames, in the general bearing of the Great Western Railway, it would reach the town of Chatham, and then pass to Pigeon Bay, on Lake Erie. The Springs of Enniskillen would appear to be north of this axis, and they may, probably, be on a subordinate one parallel with it,

#### HAMILTON FORMATION.

In the western part of Canada we have been unable to distinguish either the Marcellus shales or the Tully limestone from the Hamilton Group; and we shall, therefore, in describing the rocks of that region, include, under the name of the Hamilton formation, all the strata between the Corniferous limestones and the Genessee shales. This formation occupies the lowest portion of the saddle shaped depression before noticed as crossing the Peninsula from Lake Erie to Lake Huron, and separating the Corniferous formation into two eras. The space thus occupied is very much covered with drift, and the contact between the Corniferous and Hamilton formations has not yet been seen, so that it is not easy to assign their precise stratigraphical place to the exposures which are met with. The Oil Springs of Enniskillen, which are supposed to

have their source in the Corniferous limestones, rise through the Hamilton formation. The whole volume of this formation attains a thickness of about 300 feet.

THE PORTAGE AND CHEMUNG GROUP.

The strata of this group are wanting in Western Canada, with the exception of some portions of black bituminous shale, supposed to represent the Genesee shales. These black shales are met with at *Cape Ipperwash* or *Kettle Point*, in Bosanquet, on Lake Huron. These black shales contain so much organic matter as to take fire, and continue burning for a long time, after which the color is changed to brick-red. Black shales have also been found on the seventh lot of the third range of Warwick, and twentieth lot of the seventh range of Brooke. The Bosanquet shale yields, in distillation, about ten gallons of oil to the ton.

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