

GEOLOGICAL STRUCTURE OF THE GREAT CENTRAL PLAIN OF ALBERTA

Text of Intensely Interesting Paper by J. A. McGreor, B.A., on the Economic Minerals of Alberta, Delivered Before the Northern Alberta Teachers' Association, Dealing With the Various Periods in the Formation of the Prairies.

This great central plain is bounded on the west by the Rocky Mountains and on the east by the Laurentian plateau, which takes a more westerly direction than the Rocky Mountains, causes the gradual narrowing of the intervening plain to the north.

On the 27th parallel of latitude this plain has a width of 800 miles, while on the 49th parallel it is less than 400.

The plain slopes eastward or north-eastward to the foot of the Rocky Mountains.

A line drawn from the foot of the Rocky Mountains near the 49th parallel, to Lake Winnipeg shows an average descent of about five feet to the mile, which accounts for the generally rapid courses of the rivers of this region.

This plain is generally divided into three main steps, roughly marked by the three provinces: Manitoba, Saskatchewan and Alberta.

The Various Steps.
The first or lowest plain level is that of the Red River. Its average elevation is about 800 feet above sea level. It comprises about 7,000 square miles of prairie land, which to the eye is absolutely flat, but which in reality rises uniformly to the east and west of the river.

This is the former bed of the glacial lake Agassiz, the sediments of which constitute the rich wheat lands of Manitoba.

The Riding, Duck and Porcupine Hills mark the Western boundary of this first plain level and the beginning of the second.

The area of the second step is about 100,000 square miles and has an average elevation of about 1,000 feet. Its surface is more undulating than that of the Red River Valley and often deeply cut. The character of the soil is also more varied.

The third and highest plain extends to the Rocky Mountains and has an average height of about three thousand feet. The surface is still more irregular than that of the other two and it is evident that both before and after the glacial period the Laurentian rim.

Ever since an early Paleozoic time the area now occupied by the interior plain appears to have remained undisturbed and to have been affected only by wide movements of subsidence or elevation, which have not materially affected the regularity of the strata laid down.

Along Lake Winnipeg we find Ordovician, Silurian and Devonian rocks resting in order on the Laurentian base of the Laurentian. These rocks consist of pale grey limestones and in all probability extend beneath the entire area of the great plains, but they are wholly concealed by the later strata of Cretaceous times.

Action of River Responsible.
The Cretaceous rocks are mostly marine, that is laid down in Ocean Water, but the Dakota sandstones to the south, the tar sands on the Athabasca River and a few other deposits have been laid down by the action of large rivers.

In the eastern part of the plain during this time the deposits were marine, while in the west they seemed to be alternate periods of brackish and fresh water deposits, when the beds of lignite were laid down.

Subsequently Alberta was again a great sea when marine deposits were laid. During the Cretaceous and Miocene times there seems to have been erosion only in the area of the plains. Wide flat-bottomed valleys were cut out in the area of the foothills while to the east of there, great tracts of country between the now outstanding plateaus must have been reduced to the extent of a thousand feet or more.

The surface material of this plain are pretty much the same and a general section would be as follows:
1. A dark or blackish tough clay containing some sand or silt, but nevertheless forming when wet a soft tenacious mass very sticky and cohesive. In dry weather this bakes and becomes almost as hard as brick. In the western states this deposit is as gumbo and the name is gradually being adopted in the prairie provinces.

The thickness of this deposit is variable, from a few inches to eight or ten feet in a few local areas.

It occurs in all the hollows of the first and second steps and occasionally on the higher grounds, though on the latter in a comparatively thin sheet.

The more elevated grounds and the ridge hills are generally devoid of it. It seems to be a vegetable formation which grew in shallow lakes, ponds and swamps, accumulating in situ for ages, as described by the late Dr. H. B. Silliman, and the same time the seeds are struck and the vegetation seems to make up the bulk of this deposit. The occurrence of this deposit on the higher levels indicates that these were also marsh and swamp lands at a time comparatively recent.

Reason of Fertility.
It is this black soil that makes the plains so fertile.
2. Beneath the black loam we have a grey clay of variable thickness. This clay occurs nearly everywhere on the plains, and for it considerable quantities of brick are manufactured.

3. Below this lies a harder clay,

often called hardpan. The thickness of this varies. In the Red River valley it is forty feet thick. This series of deposits, with local variations may be found over most of the prairies.

As in the eastern part of Canada, and also in the northern part of Europe, the great plains were overtopped to a more or less extent by glaciers, during that period known as the Ice Age.

The eastern part of the Red River valley, was covered with ice that came from the parent Laurentian glacier, in the interior of Keewatin, while the ice that covered Alberta came from the glaciers in the Rockies.

During this period the Laurentian was in the main an area of denudation. From it the surface materials were carried in all directions, even to the north, for there is no evidence that any ice flow ever came from the polar regions to the continent of North America.

The generally bare ice scored rocky surfaces of these highlands is evidence of this denudation, while we find boulders of these Archean or Laurentian rocks scattered over the first and second prairie steps.

Doubt as to Extent.
There is some doubt how far south the Laurentian ice flow went, but roughly a line drawn from the south-eastern extremity of Lake Michigan to New York would mark its Southern boundary.

Towards the decline of the glacial period the region of the great lakes was occupied by a succession of fresh water basins, hemmed in on the north by the retreating edge of the Laurentian glacier.

At the same time as the Laurentian was pouring its ice fields over Saskatchewan and Manitoba, the Rockies standing at a relatively high elevation, became covered with a continuous ice sheet, extending approximately from latitude 48 to 63, with a total length at its maximum of about 1,200 miles.

The form of the surface prevented the ice from discharging in all directions like that in Keewatin, and nudging forces of rain and rivers have acted upon it longer and more energetically.

Is a Shallow Trough.
Taken as a whole the central plain may be regarded as a shallow trough of which owing to post differential uplift the western floor is now higher in actual elevation than its eastern Laurentian rim.

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3. Below this lies a harder clay,

This coal very readily disintegrates on exposure to the air and has usually about 60 per cent. or less of fixed carbon.

The coal around Edmonton, though known as lignite, might rather be described as semi-bituminous, though it lacks the tarry material or bitumen. The coal does not underlie the whole of the prairie, and passes through the different stages of metamorphosis as the mountains approach.

In Manitoba we have a very soft lignite of brown color, in Saskatchewan we have lignite. Here around Edmonton we have a semi-bituminous grading into bituminous in the Peace River district, while in the disturbed areas in the mountains we have anthracite.

Bituminous coals though divided into several groups have the common characteristics of burning with a smoky yellow flame and give off oil and tar on distillation.

They contain about 60 to 75 per cent. of fixed carbon and from 20 to 45 per cent. of volatile matter.

Coking Coals.
Our first sub-division of bituminous, when heated and become pasty, and a semi-bituminous, when heated, give off a volatile matter, which is often known as asphalt. There is enough of this material to pave the streets of the world, though it is yet considered distasteful to level at him getting it to be hardened. No doubt, some simple means of hardening this material will be discovered which will not burn off the volatile matter, and the Alberta and Great Waterways Railway to Fort McMurray will open up this section and will furnish fuel for the steam engines.

The fact that this crude oil has been soaking through the earth's crust for an immense period of time, shows that the strata surrounding these great bodies of petroleum are of a porous nature and have allowed the oil to soak through. This is an argument brought forward by some geologists that the oil will not be found in paying quantities in this vicinity.

A certain resemblance of the geological structure exists between Western Canada and the great California oil fields and the opinion of those who have made a study of the area is that the large bodies of crude petroleum will be found near the mountains in the Peace River district.

These minerals and mineral products that I have very hurriedly taken up are nonpareil. They are the most important of Alberta's economic minerals that have as yet been discovered.

The fact that Mr. McMurtry there are great beds of salt. The sands of most of our rivers contain grains of glauconite and platiniferous. On the south bank of the Peace River there are deposits of gypsum, while large beds of sulphur are found in the vicinity of Lake Athabasca.

These great mineral wealth exists in the older rocks that outcrop in the Peace River district and nearer the mountains.

The second is the Belly River formation, which is a very important part of the geological structure of the province. It is a very important part of the geological structure of the province.

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TURBULENT SCENE IN THE COMMONS

Lord Advocate For Scotland Replies to Balfour's Charges—Latter Refuses to Withdraw.

London, Nov. 3.—The House of Commons had the unusual experience tonight of hearing a member of the government defend his honor from an attack made on it outside the House. Extra parliamentary speeches were customarily ignored—on the House—but when "Alexander" Ure, Lord Advocate for Scotland, rose in front of the ministerial benches in the course of the final debate on the budget, it was well known that he meant to reply to ex-Prime Minister Balfour's recent onslaught on him, and the house was immediately agitated with excitement.

The whole ministerial side gave the Lord Advocate a tremendously explosive ovation with their whole-hearted approval of his speech. Mr. Ure said he interpreted his reception as betokening that his colleagues did not think him unworthy of his office or membership in the House of Commons.

His speech greatly excited his supporters, who shouted "shame" and "outrage" against the Opposition.

He gave the speaker another ovation when he concluded by saying the shabby charges which Mr. Balfour had made were unwarranted and were unparalleled in the history of Great Britain since the days when it was proper for a man to defend his honor with his own right arm.

Balfour Makes Reply.
Mr. Balfour arose and was wildly applauded by his supporters. He declared that he would not withdraw one word of his attack. He disavowed the smallest personal animosity, but said he was moved to indignation when gifts of oratory as great as Mr. Ure's were used to raise fear among the poor and ignorant. Everybody, he added, knew that each party regarded as sacred any national obligations undertaken by parliament, but Mr. Ure had tried to persuade an audience that there were certain obligations which were not sacred to his political opponents.

While Mr. Balfour was speaking the Speaker of the House had to appeal to the Liberals for order, as they were persistently interrupting him.

Government Behind.
When Mr. Balfour had finished, Premier Asquith formally identified the government with Mr. Ure's utterances, and he said he regretted that Mr. Ure had not apologized. His charge against Mr. Ure was an outrage upon their public life. There was never a more disgraceful chapter in the history of British politics than the action regarding old age pensions. They had dangled them before the eyes of the poor in order to catch votes, but they had never raised a finger to fulfill their pledges. Mr. Ure had fully repudiated and repudiated the outrageous suggestion against his honor and would leave the House with the honor and absolute confidence of his colleagues and constituents.

This brought forth a torrent of shouts of "withdraw" directed at Mr. Balfour from the ministerial benches, but the former prime minister took no notice. The matter stands where it did, except for the government's official adoption of Mr. Ure's position.

FIGHTING THE WHITE PLAGUE.
Mrs. W. K. Vanderbilt Applies \$1,000,000 to Campaign Against Overcrowding.

New York, Nov. 4.—About 375 families of moderate circumstances, in each of which one or two are victims of consumption, will soon be able to take advantage of the unique efforts of Mrs. W. K. Vanderbilt, sc., to help fight against the white plague. Work is about to be started on the "Shively Sanitary Tenements" accommodating the above number of families in Avenue A between 7th and 8th streets, this city, which she proposes to spend \$500,000 exclusive of the cost of the land.

Mr. Vanderbilt for a Christmas present last year gave her \$1,000,000 and she determined to spend it in helping people less fortunate. The idea came to her that tenements should be clean and airy and which should have arrangements for eating and sleeping out of doors. She consulted with Dr. H. A. Shively, an expert in tuberculosis, and he helped her to work out the plans for the buildings. She named them in honor of him. The plans which were completed several months ago call for four model tenement buildings.

EVIDENCE OF IMPERIAL UNITY.
Is Found in Formation and Work of West India Trade Commission.

London, Nov. 4.—Speaking to the West India Club, Colonel Seely, M.P., remarked that the Royal Commission investigating the West Indies trade with Canada was unique in its constitution and a remarkable proof of the growing sense of Imperial unity.

He expressed sympathy with the Colonial office in its work. Sir Daniel Morris emphasized the necessity of better communication between Canada and the West Indies, pointing out that the Canadian government was prepared to increase its subsidy. He also paid a tribute to the Canadian government for its efforts to encourage trade with the West Indies.

He said the commission's report would be a practical one, of benefit to the business people of the empire.

Baddeck No. 2 Goes Another.
The other day, Nov. 3—J. A. McCurdy made a successful trial flight with Baddeck No. 2, on the Bennett farm near here. He made a series of rounds of a mile each with a successful start and landing. He crossed the river four times during the flight reaching a height of eighty feet.

BULK TEA LOSES FLAVOR

It not only loses flavor but it takes on new ones, such as kerosene, molasses, onions, coffee, soap etc., to say nothing of its exposure to sun, dust, dirt and air. To overcome this

"SALADA"
is sold only in sealed lead packets—never in bulk

THE EDMONTON CITY DAIRY, Limited
Established 1906.
MANUFACTURERS OF CREAMERY BUTTER.

Also dealers in Milk, Cream, Eggs, Butter and Buttermilk
Delivered to any part of city daily. Phone 3102.

Dairymen that have never sold their cream will do well to give us a trial. Why do all the work of making butter and selling it, when you can sell the cream for cash. If you would like to try a few shipments send your cans to Edmonton City Dairy, Ltd., Edmonton or Strathcona. We pay express and return cans free.

If you haven't any cans write us and we will loan you cans while you give us a trial. We also pay highest price for fresh eggs. Our factory operates the year round. We are always glad to meet any visitors.

PORT SASKATCHEWAN POWER PLANT BURNED
The Building of the Plant Which Has Recently Been the Subject of Much Litigation Destroyed by Fire at Half Past Nine This Morning.

Fort Saskatchewan, Nov. 4.—Fort Saskatchewan is again in darkness. At half past nine this morning the electric power house was completely gutted by fire. The cause is unknown but the general suspicion is that it was of incendiary origin. The plant is valued at about \$30,000 and while the building is destroyed it is not as yet known whether the machinery is ruined. This cannot be determined until an expert makes a valuation.

The Fort electric plant has been the subject of a large amount of litigation between the town and the owners in the past few months. It was first owned by O. Hignam, later by the Fort Electric Co. and recently has been in the possession of Mr. Christopher Wood, mother-in-law of Mr. Hignam.

Recently an action was begun by the town to have the franchise granted in 1906, declared forfeited. Such a decision was given by Mr. Justice Stuart in the Supreme court, but the decision was reversed by the court en banc and the company was given until Nov. 1st to have it again in running order. Last Monday night, Nov. 1st, it was started and the franchise was retained.

After Justice Stuart had made the order for the franchise the town site to the Hydro-Electric project. The town of Fort Saskatchewan passed a by-law to erect their own plant, but this action obtained a setback by the decision of the court en banc.

About two years ago the plant was destroyed by fire, but was rebuilt. Those opposed to the company claim that it has not since been in good condition.

BROKE ALI AEROLANE RECORDS
Farnham Remained Aloft Over Four Hours and Travelled 144 Miles.

Paris, Nov. 3.—Henry Farnham broke all aerolane records for distance and duration today in a flight for the Michelin cup at Chalon camp. He remained in the air four hours, seventeen minutes and fifty-three seconds and covered 144 miles. The weather today was ideal, it being gray and windless, although the cold was severe. The aviator received an ovation when he landed.

Fifteen Years for Attempted Murder.
Parry Sound, Ont., Nov. 3.—Nicola Aiello, an Italian, was sentenced to fifteen years in the penitentiary for the murder of John Magee for attempted murder. He was indicted on a charge of attempted murder of John Magee, who was a member of the Italian community in Parry Sound.

An Aerial Sham Battle.
Poulin, Nov. 4.—The military aviators who are carrying on a series of manoeuvres at Colonge, had an aerial sham battle last night. The first in the history of aviation. The battle lasted for three hours. The aviators circled about the famous fortress of Ebenrobert, which was illuminated by the searchlights making feigned attacks and then retreating to escape the anti-airship guns. Nothing resembling explosives were dropped, but the Zeppelin airship threw a message of greeting.

Which Railway Line is This?
London, Nov. 4.—A Canadian railway loan of £1,500,000 in five per cent. debentures at 105, guaranteed by one of the provinces is anticipated shortly.

Pentland to Succeed Grey.
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WETASKIWIN TO VOTE ON A NEW HOSPITAL

Ratifiers Will Be Asked to Provide \$30,000 for Building and Equipment for the New Institution in the Elevator City.

Wetaskiwin, Nov. 3.—A most enthusiastic meeting of the citizens of Wetaskiwin was held in the council chamber on Monday evening, November 1st. The purpose of the meeting was to decide the report of a committee appointed at a previous meeting in July on the matter of a hospital. Rev. Aldridge was appointed chairman and Alderman Montgomery secretary.

The report which was made by J. F. Forbes recommended the erection of a hospital by the city which with its equipment would cost \$30,000. After some discussion it was unanimously decided to take the matter to the voters at the coming municipal elections, a by-law for the erection of a municipal hospital, a large committee was appointed to thoroughly canvass the whole city and secure a full vote upon the by-law when submitted. All felt the need of such a hospital and that it should be undertaken and that from the experience of the temporary hospital now in use, there was not the least doubt but that it would be not only a great benefit but a financial success.

The Wetaskiwin Post which for some time has had its business on Railway street east, was removed today to the building formerly occupied by R. M. Angus as a warehouse, opposite the Times office. The first issue under the new management of Keith and Andrews will appear this week.

The Bishop of Calgary confirmed a class of nine candidates on Sunday morning, October 31st, in Immanuel Church.

Seek Charter For New Railway.
London, Ont., Nov. 4.—Application has been made to the Dominion Parliament for a charter for the London and Lake Erie Railway, capital \$2,000,000, to operate a line between Brantford and London, running through Paris, Ingersoll, Woodstock, with running rights over the line already built from Brantford to Hamilton. It is understood the project is being financed by men who will back the Hydro-Electric proposition. Very wide powers are asked from the government.

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