EDMONTON BULLETIN, MONDAY, NOVEMBER 8, 1909. **GEOLOGICAL STRUCTURE OF THE GREAT CENTRAL PLAIN OF ALBERTA**

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Text of Intensely Interesting Paper by J. A. McGregor, 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 often called hardpan. The thicknes-on the west by the Rocky Mountains of this varies. In the Red River val-on exposure to the air and has usuand on the east by the Laurentian ley it is forty feet thick. plateau, which taking a more west. This series of deposits with local carbon. The or tains, causes the gradual narrowing of the prairies. ally about 50 per cent. or less of fixed

The eastern part of the Red River

tains, causes the intervening plain to the north. As in the eastern part of Canada scribed as semi-bituminous, though it north of radionated gas has been been were customarily ignored. At Pelican Rapids, a govern-On the 5th parallel of latitude this and also in the northern part of Eu-lacks the tarry me rial or bitumen. Sourced. At Pelican Rapids, a govern-were customarily ignored - non the role in the source of the intervening for oil. At a depth of 800 House, but when Alexander Ure on the h parallel it is less than to a more or less extent by glaciers, whole of the prain and pass through was boring for oil. At a depth of 800 Lord Advocate for Scotland, rose during that period known as the Ice

ale plain slopes eastward Age. The or nort., castward to the foot of the Laurentian Highland.

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valley, was covered with ice that came from the parent Laurentian A line drawn from the foot of the glacier, in the interior of Keewatin, Rocky Mountains near the 49th paralto Lake Winnipeg shows an averwhile the ice that covered Alberta age decent of about five feet to the came from the glaciers in the Rockies. mile, which accounts for the general ly rapid courses of the rivers of this was in the main an area of denuda

This plain is generally divided into three prairie steppes, roughly marked by the three provinces: Manitoba, that any ice flow ever came from the Saskatchewan and Alberta. The Various Steppes

The generally bare ice scored rocky The first or lowest prairie level rface of these highlands is evidence that of the Red River. Its average elevation is about 800 feet above sea of this denudation, while we find boulders of these Archaean or Laurevel. It comprises about 7,000 squar, entien rocks scattered over the first miles of prairie land, which to th eye is absolutely flat, but which and second prairie steppes. Doubt as to Extent reality rises uniformly to the east and There is some doubt how far south

west of the river. his Laurentian ice floe went, .but This is the former bed of the glaci: roughly a line drawn from the south lake Agissiz, the sediments of which rn extremity of Lake Michigan to constitute 'the rich wheat lands, « New York would mark its Southern Manitoba boundary.

The Riding, Duck and Porcupin Towards the decline of the glacial Hills mark the Western boundary of eriod the region of the great lakes this first prairie level and the be was occupied by a succession of fresh ginning of the second. basins, hemmed in on the vater Th area of the second steppe north by the retreating edge of the about 105,000 square miles and has . Laurentian glacier.

average elevation of about 1,600 feet At the same time as the Laurentian Its surface is more undulating that that of the Red River Valley was pouring its ice fields over 'as. katchewan and Manitoba, the Rochies and often deeply cut. The character standing at a relatively high elevaof the soil is also more varied. tion, became covered with a conflu-The third and highest plain exent ice sheet, extending approximatethe Rocky Mountains and ly from latitude 48 to 63, with a total has an average height of about three length at its maximum of about 1,200

thousand feet. The surface is still miles more irregular than that of the other two and it is evident that both before the ice from discharging in all dirand after the glacial period the deections like that in Keewatin, and nuding forces of rain and rivers have forced the bulk of the outflow more acted upon it longer and more energesouth eastward north westward, in tically. conformity with the direction of th

Is a Shallow Trough. ruling mountain ranges.

the area now occupied by the interior came from the Rockies while that of plain appears to have remained und the first and second steppes came platinum. On the south bank of the was never a more discreditable chap 1-Lignite beds platinum. On the south bank of the was never a more discretance di discretance discretance Wetaskiwin, Nov. 3 .- A most en 2 Bituminous deposits. 3 Anthracite. disturbed and to have been affected from a point somewhere to the ence or elevation, which have not ma-terially affected the regularity of the strata haid down Hudson Bay, and that the boulder 4-Natural gas. abasca. Doubtless great mineral wealth ex-ists in the older rocks that outcorop in the Peace river district and nearer the mountains. In conclusion I would say that and would leave the House with the In conclusion I would say that In the the mountain I would say that I wo 6-Gypsum -Salt beds. -Clay suitable for brick. Along Lake Winnipeg we find Or- ice. Formation of Swamps. These are all non-metallic minerals dovician, Silurian and Devonian Immediately after the ice melter and as far as is yet known, the non-Rocks resting in order on the stable we have a series of swamps or In conclusion I would say that regeous suggester a show with the practically all the teristory north of and would leave the House with the honor and absolute confidence of it is not as yet known whether the The report which was made by J. metallic are by far the most importbase of the Laurentian. These rocks consist of pale grey limestones and marshes existing over the area ant of our economic minerals. in all probability extend bneath the the whole plains, when the decayed pected, except along the larger rivers, his colleagues and co-members. Three Distinct Formations. machinery is ruined. This cannot be F. Forbes recommended the erection entire area of the great plains, but vegetation accumulating in situ, has The coal deposits of Alberta are found in three distinct formations in This brought forth a torrent and fortunes abound there for those they are wholly concealed by the later given us the black fertile soil the determined until an expert makes a of a hospital by the city which with "withdraw." directed its equipment would cost \$30,000. who are lucky enough to discover the shouts of valuation. has already been described. the cretaceaous, separated by shales mineral wealth that without doubt Mr. Balfour from the ministerial The Fort electric plant has been. After some discussion it was unanimstrata of Cretaceous times. This concludes what I have to say of marine origin. lies hidden in the older rocks of that benches, but the former prime minthe subject of a large amount of liti- ously decided to ask the council to Action of River Responsible. The lowest is the base of the formaon general geology of the prairies and part of our province. ister took no notice. The matter gation between the town and the own- submit to the ratepayers at the com . The Cretaceous rocks are mostly the principal points noted might te tion and has been given the name of stands where it did, except for the first owned by O. Higman, later by the exciton of a municipal hospital. marine that is laid down in Ocean summed up as follows :-government's official adoption Mr. Ure's position. Kootanie. 1-In palaeozoic times the plains HIGH PRAISE FOR THE Water, but the Dakota sandstones in The second is the Belly river forhe Fort Electric Co. and recently has A large con mittee was appointed to the south, the tar sands on the Atha were covered with sea water, when mation and contains very few workeen in the possession of Mrs. Chris- thoroughly canvass the whole city baska River and a few other deposits **MANAGEMENT OF I.C.R** the old limestones were laid down able seams. FIGHTING THE WHITE PLAGUE. opher Wood, mother-in-law of Mr. and secure a full vote upon the by have been laid down by the action from the rock waste of the Laurentian The third coal deposit is at the top law when submitted. All felt the ligman. and Archaean rocks in the Dockies. Mrs. W. K. Vanderbilt Applies \$1,000,000 of large rivers. of the cretaceous and is known as the Recently an action was begun by time was at hand when such-a In the eastern part of the plain dur-2-During the earlier part of the Edmonton formation. to Compaign Against Overcrowding. he town to have the franchise, grant- should be undertook and that from secondary period there was a time of The first, or Kootanie formation, is Many Kind Words Said in Approval of ing this time the deposits were ma-Such the experience of the temporary hosin 1906, declared forfeited. New York, Nov. 4-About 375 families rine, while in the west there seemed Way Road is Run-Dismissals Necesexposed in the disturbed areas in and near the mountains. The coal is a was not the denudation decision was given by Mr. Justice pital now in use, there of moderate circumstances, in each of which one or two are victims of conbe alternate periods of brackish 3-During cretaceous times we again sitated by General Fallinf Off in Stuart in the Supreme court, but aft- least doubt but that it would be not and fresh water deposits, when the Traffic on All Lines. have a sea, when marine deposits bituminous and in some cases semierwards was reversed by the court en only a great benefit but a financial sumption, will soon be able to take adbeds of lignite were laid down. Sub were laid down, including the coal anthracite. This coal has been traced vantage of the uniquie efforts of Mrs. hanc and the company was given un- success sequently Alberta was again a great I Nov. 1st to have it again in run- The Weteskiwin Post which for from the boundary as far north as the beds of Alberta. W. K. Vanderbilt, sr., to help fight when marine deposits were laid. 4-During miocene and pliocene Yellowhead pass. These Kootar Ottawa, Nov. 4-Discussing the critining order. Last Monday night, Nov. some time has had its business on 1st, it was started and the franchise. Raitway street east, was removed to-During pliocene and Miocne times. against the white plague. Work is about times again erosion, when posisbly measures as far as is known, have an cism of the present Intercolonial manbe started on the "Shively Sanitary there seems to have been erosion only thousand feet of previous de- area in Alberta of 288 square miles agement today, Hon. George P. Graham Tensments" accommodating the above day to the building formerly occupied over a was retained. in the area of the plains. Wide flat and contain an estimated coal con- said he had been following pretty closely number of families in Avenue A between -The glacial age, at a time composits were eroded. After Justice Stuart had made the by R. M. Angus as a wareroom, oppobosts were eroded. 5—The glacial age, at a time com-bert of 8,000 million tons. About 400 clays and sands of the plains were deposited. and contain an estimated coal con-bet to 8,000 million tons. About 400 clays and sands of the plains were deposited. and contain an estimated coal con-bet to 8,000 million tons. About 400 clays and sands of the plains were deposited. and contain an estimated coal con-bet to 8,000 million tons. About 400 clays and sands of the plains were deposited. and contain an estimated coal con-bet to 8,000 million tons. About 400 clays and sands of the plains were deposited. and contain an estimated coal con-bet to 8,000 million tons. The middle coal formation, known bottom valleys were cut out in the order forfeiting the franchise the town site to the Times office. The first area of the foothills while to the n' Fort Saskatchewan passed a by- issue under the new management of east of there, great tracts of country law to erect their own plant, but this Keith and Andrews will appear this between the now outstanding pla deposited. 6-At a time comparatively recent, again a period of deposition, when our surface black soil was laid, Coal Formation. Coal is essentially carbon, associ-ated with various hydrocarbons, that c be a to be a compound of carbon and te to the next part are thin, but is chearbear and part ar action obtained a set-back by the week. teaux must have been reduced to the The Bishop of Calgary confirmed decision of the court en banc. extent of a thousand feet or more. class of nine candidates on Sunday destroyed by fire, but was rebuilt. Those opposed to the company claim The Cypress Hills are merely an outstanding section of the deposits which spread over the whole of Alberta. The Surface Materials. that it has not since been in good Seek Charter For New Railway. The surface materials of this plain is chemical compounds of carbon and hydrogen. det thick is worked at several places Speaking of the dismissals, Mr. Gra-Shively, anexpert in tuberculosis, and ondition. are pretty much the same and a gea London, Ont., Nov. 4.-Application feet thick is worked at several places BROKE ALL AEBOLANE RECORDS has bene made to the Dominion section would be as follows: It is the result of the decomposition near the C. P. R. railroad. ham said: "There have been quite a he helped her to work out the plans for 1. A dark or blackish tough clay containing some sand or silt, but number and I am free to confess this the buildings. She named them in honor Parliament for a charter for the Lonof water and out of contact with the air. 4 Beds of peat resulting from such series. This is a series of brackish of vegetable matter, in the presence Continuous Coal Fields. Farnam Remained Aloft Over Four on and Lake Erie Railway, capital nevertheless forming when wet a soft Hours and Travelled 144 Miles. \$2,000,000, to operate a line between tenacious mass very sticky and co-Brantford and London running Paris, Nov. 3.-Henry Farnam herent. In dry weather this bakes through Paris, Ingersoll, Woodstock, asked to seek new employment, particudecomposition were in time covered water beds at the top of the cretace broke all aeroplane records for disand becomes almost as hard as brick. larly if he has a family. It must be re- EVIDENCE OF IMPERIAL UNITY. with running rights over the line alwith other deposits and were gradu- ous, and shows that this large actance and duration today in a flight In the western states this deposit ally consolidated and metamorphos-cumulation of carbonaceous material an enterprise on which it is expected was formed at about sea level. The that the income will at least balance th. ready built from Brantford to Hamfor the Michelin cup at Chalon camp. an enterprise on which it is expected is Found in Formation and Work of It is understood the project as gumbo and the name ton. He remained in the air four hours, gradually being adopted in the prairie strata and the heat of the earth, into vicinity around here is almost a coal, the variety depending upon the continuous coal field. The coal is s being financed by men who will West Indies Trade Commission. seventeen minutes and fifty-three secexpenditure, and that the railway cor ack the Hydro-Electric proposition. London, Nov. 4 .- Speaking to th onds and covered 144 miles. porations reduce their staffs the moment The thickness of this deposit is var Very wide powers are asked from stage to which the metamorphosis has lignitic and only in disturbed areas there is a falling off in traffic without West India Club, Colonel Seeley, weather today was ideal, it being iable, from a few inches to eight pr near the mountains does it approach bituminous. The area over which this During the past three years the mission investigating the West Indies During the past three years the mission investigating the West Indies over which this was severe. The aviator received and over the mission investigating the was unique in ovation when he landed. progressed. the government. gray and windless, although the coid ten feet in a few local areas. Peat grades into brown coal or lig- bituminous. The area over which this It occurs in all the hollows of the An Aerial Sham Battle. Canadian lines have laid off thousands trade with Canada was unique in of men, and if the Intercolonial was to its constitution and a remarkable first and second steppes and occas-sionally on the higher grounds Lignite grades through semi-bitum- ous and in the foothills alone is es Berlin, Nov. 4-The military aerostats of men, and if the Intercolonial was to be saved from a very large recurring de-bet in hor a very large recurring de-bet in hor a very large recurring de-perial unity. He expressed sym-a duce the staff until such times as busi-bet of a would be pleased to see such a betterment of traffic as would compel the board to largely increase the num-ber of employes. inous into bituminous, while bit- | timated at two thousand square miles. though on the latter in a comparative ninous grades through semi-anthra- On the prairies there is 10,800 square thin sheet. ite to Anthracite. miles underlain by this Edmonton The more elevated grounds and the Graphite represents a still higher formation which will average a good ness warranted its increase again." ridge hills are generally devoid of it stage in the change of vegetable car-bon into mineral matter, while the disix feet. The foothills show seams as It seems to be a vegetable formation hick as 24 feet and is a much suwhich grew in shallow lakes, pondamond is the ultimate product, pure perior coal to that further east. and swamps, accumulating in site "I have noticed the criticisms, most of which are fair and not unexpected, but I think it not quite just to single out one official circuit of single attribute to the Canadian \$25 from Den Demoff. to a boarding car occupied by Bulcrystallized carbon. Estimate of Coal. making feigned attacks and then refor ages, as dead and decayed water Coals are usually classified accord Lower cretaceous Kootanie forma reating to escape the anti-airship guns. He garian railway navies, and borrowed and marsh plants together with peat ing to the amount of volatile matter Nothing simulating explosives ion (bituminous and anthracite), 288 He ther were and other vegetation seems to make but I think it not quite just to single out government for its efforts to encour-learned that Demoff. He then government for its efforts to encour-learned that Demoff had \$260 in his age West Indies trade. He said the belt and waylaid Demoff, who was one official for special attack, when he is practical one of benefit to the pusithey contain, and the character of this lropped, but the Zeppelin airship threw quare miles: 8,000 million tons. up the bulk of this deposit. The oc volatile matter. retaceous, Belly River formatio message of greeting. curence of this deposit on the higher lignitic), 6,000 square miles; 26,000 but one member of the board, each one of whom must accept responsibility for ness people of the empire. 1 Various Kinds of Coal. levels indicates that these were also Which Railway Lan is This? On this basis we may divide them nillion tons. marsh and swamp lands at a tim-Upper cretaceous and Laramie, Ed London, Nov. 4-A Canadian ' railway comparatively recent. s follows :-monton ormation, (lignitic), 12,800 square miles; 71,000 million tons. Lignite or brown coal-Coking. ously hurt. He recognized his asoan of £1.500,000 in five per cent. de-Reason of Fertility. centures at 103, guaranteed by one of Baddck No. 2 Goes Another. It is this black soil that makes the Bituminous-Non-coking; cannell. "All who have given the question. sailant. study, agree that the task undertaken Baddeck, ...S., Nov. 3.-J. A. Mc Curdy made a successful trial flight The other mineral products closely the provinces is anticipated shortly. Anthracite. plains so fertile. 2. Beneath this black loam w Lignite or brown coal is sometimes allied with coal are natural gas and Three Cardinals to be Appointed. cluding among other things the density with Baddeck No. 2, on the Bennett and grade of traffic, are not conducive farm near here. He made fourteen pitch black but oftener rather dull oil. Underlying the whole of Alberta Pentland to Succeed Grev. have a grey clay of variable thickness Rome, Nov. 4 .- It is learned that London, Nov. 4-It is persistently rethere seems to be great reservoirs of occurs nearly everywhere and brownish black. the highest results, either financially rounds of a mile each with a success at the consistory to be held late in December or early in January, three Earl Grey and Herbert Gladstone will This clay It is compressed and altered veget-able matter, partially carbonized, in-The gas has been discovered in sevon the plains, and from it consideror otherwise. However, the greater the ful start and landing. He crossed able quantities of brick are manu able matter, partially carbonized, inremediate in its qualities between eral places though oil in paying quan- difficulties, the deeper the satisfaction if the river four times during the flight reaching a height of eighty feet. factured. 3. Below this lies a harder clay, peat and coal.

ing of this year he has struck oil in such a quantity, as to warrant a pipe line from the oil fields to this. He states that he has 14 wells that duce about forty barrels per day each, and looks for much better r sults as he gets to lower levels. This flow is at about 1,400 fett. There is no doubt but that oil in large

quantities exist, and perhaps Mr. Von Hammerstein has been lucky ough to find a paying well. These fourteen wells are in the neighborhood of Fort McMurray.

Evidences of Natural Gas. Commons had the unusual experience Medicine Hat is heated and lighted tonight of hearing a member of the The coal around Edmonton, though with natural gas, which costs 15 cents government defend his honor from known as lignite might rather be de- a thousand feet. At several places an attack made on it outside As in the eastern part of Canada, scribed as semi-bituminous, though it north of Edmonton gas has been dis- house. Extra parliamentary speeches is sold only in sealed lead packets-never in bulk the different stages of metamorphosis set they struck a tremendous flow of front of the ministerial benches as the mountains are approached. In Manitoba we have a very soft from boring any further. They stop-lignite of brown color, in Saskatche- ped boring, thinking that the well meant to reply to ex-Prime Minist wan we have lignite. Here around would exhaust itself, but this has not Balfour's recent onslaught on him Edmonton we have a semi-bituminous been the case, and this gas with a and the house was immediately agog grading into bituminous in the Peace flame of about 40 feet has been burn, with excitement. The whole minis-River district, while in the disturbed ing for the last 11 years. Recently a terial side gave the Lord Advocate During this period the Laurentian areas in the mountains we have an-thracite.

was in the main an area of denuda-tion. 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

that any ice flow ever came from the polar regions to the continent f North America in the House of Commons. They contain about 60 to 75 per beds of sand, that have become satur. His speech greatly excited his supeent. of fixed carbon and from 20 to 45 per cent. of volatile matter.

often known as asphalt. There is and gave the speaker another ova-Coking Coals. Coking coals, our first sub-division of bituminous, soften whn heated and streets of the world, though ts yet the shabby charges which Mr. Balbecome pasty, and the pieces gum to-gether. If this heating is done in in getting it to harden. No doubt were unparalleled in the history of wens with a limited supply of air, so some simple means of hardening this Great Britain since the days when that the volatile is distilled off with material will be discovered which will was proper for a man to defend hi out burning the carbon, the latter will render this deposit of immense value. honor with his own right arm.

Balfour Makes Reply. remain, giving us what is known as The Alberta and Great Waterways Non-coking coal is apparently in no up, this section and will furnish applauded by his artisans. He de vise different from coking coal, but freighting facilities for these sands. clared that he would not withdray The fact that this crude oil has been one word of his attack. He dis will burn freely without any indicasoaking through the earth's crust for avowed the smallest personal and tion of softening or fusing together.

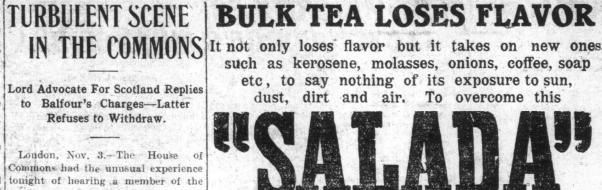
There is no plausible rtason yet ad-duced why some coals should coke and others apparently the same should coke and that the strata surrounding these great as Mr Ure's were used that the strata surrounding these others apparently the same should not. The only way to recognize a coking coal is to coke it. The third variety of bituminous is known as cannell coal. It has a slaty appearance and a very smooth sur-tities in this vicinity.

appearance and a very smooth sur- tities in this vicinity. to persuade his audience that there y from latitude 48 to 63, with a total ength at its maximum of about 1,200 niles. The form of the surface prevented the manufacture of gas. The form of the surface prevented the manufacture of gas.

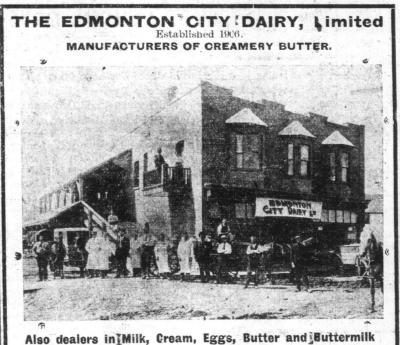
Anthracite, the hardest of all the have made a study of the areas is that While Mr. Balfour was speaking coals, has a Lright lustre. Its coior the large bodies of crude petroleum the Speaker of the House had to an iron black and contains about 80 will be found nearer the mountains in peal to the Liberals for fair play, a 95 per cent. of fixed carbon, and the Peace River district. they were persistently interrupt is low in volatile matter. It purns

These minerals and mineral pro- him. without smoke, with a weak or no ducts that I have very hurriedly tak-

our rivers contain grains of glod and rage upon their public life.



PAGE FIVE.



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Government Behind. flame, of intense heat. It represents Though the main flow of these 'ce en up are non-metallic and are by far When Mr. Balfour had finished may be regarded as a shallow trough fields was north and south, yet limit. an extreme metamorphosis of coal un-Taken as a whole the central plain der the influence of heat pressure and the most important of Alberta's eco- Premier Asquith formally identifie e, bright, of which owing to post differential uplift the western floor is now high r in actual elevation than its eastern nomic minerals that have as yet been the government with Mr. Ure's ut-Fhe Building of the Plant Which Has Ratepayers Will Be Asked to Provide hot and volcanic action. discovered. Near Fort McMurkay there are great Mr. Balfour had not apologised. His discovered. The economic minerals of Alberta Recently Been the Subject of elephone Much Litigation Destroyed by Fire We see then that the ice that covnaturally fall under the following beds of salt. The sands of most of charge against Mr. Ure was an out-Laurentian rim. Ever since an early Palaeozoic time ered Alberta during the glacial age heads :at Half Past Nine This Morning centrally streetsom where pleasant and every ome-like. ch quality ne Ameri-European bus meets EL ann, Prop Ads. mers of the Car ole are not doing ndid soil which te. If care is not come a time ir ba and Saskatch when the average gher than it is in Dakotas today. SOLD AS JUNK. ve Turkish Battle Scrap Heap. . 2-Iron and steel received reque overnment to sub the most notable er put up for sale Ottoman navy, as ids will be received sale of five battlection at a anks near the botnaval powers, is a ime to regain the New ships will discarded ones. ed for sale are hmudieh. the Os h, and the Hami-1865 while the ched until 1885 vpe, being of 6,400 nd bearing 10-inch nch guns, and have of the British of subordinate now engaged in rkish navy. They policy of pretence same time the els are stricken leships as ineffec sold to the highest dealers throughout nvited to bid.