

ON THE DEVELOPMENT OF CANADA

The Geographical Journal, in its October issue, has the very interesting paper which was read before the Royal Geographical Society entitled, "Conditions Affecting the Development of Canada," by Prof. W. L. Grant, M. A. The concluding portion follows:

Thus, then, Canada is expanding northward. She is no longer a tape-worm, but resembles a wasp with the waist at Winnipeg. Not a bale of goods, not an emigrant can go from east to west without passing through that city. It is well for us that war between the British Empire and the United States is now—thank God!—practically unthinkable, for I know of no country in the world so easy to cut in two as Canada. A dash over 70 miles of flat country into an unfortified and unfortifiable on an open plain, and Canada falls as hopelessly in two as a wasp hit by a carving knife. Luckily, such a war is, as I have said, now almost as unthinkable as one between England and Scotland.

This weakness will soon be partially remedied by the construction of the Hudson Bay railway, from a point on the main line of the Canadian Northern, probably the Pas, near the old Hudson Bay Company's post of Norway House, to Hudson Bay. On this subject I must refer to the articles in the Times of September and October, 1910, which I violate no secret in saying were not written without consultation with the best opinion of the Canadian Geological Survey. From Liverpool to Fort Churchill, at the mouth of the Churchill River, is 2946 nautical miles, only 10 miles more than the distance to Montreal by Cape Race, or 185 more than by Belle Isle, while the bulk of the west is fully 1000 miles nearer to Churchill than to Montreal. On this new and shorter outlet to the west water the heart of the west is set. But though the country from the Pas to the Bay presents no engineering difficulties whatever, there remain the two questions of a harbor and of the length of time of open water. Fort Churchill, 170 miles from the Pas, is a splendid harbor, but small, and the possibility of its extension is made doubtful by fears of a bottom of solid rock. The mouth of the Nelson River, 410 miles from the Pas, seems at first sight more suitable, but in the words of a well known British navigator, it is "the last place God Almighty ever intended for a harbor." To quote from the Times, "The mouth of the Nelson is encumbered by shoals running 15 miles and more out to sea. The deep channel through these would require to be elaborately buoyed and lighted, and in the actual estuary the anchorage would have to be connected with the land by a pier or wharf running out over the shoals for nearly two miles from shore, while the shoals would as far as possible, have to be filled up by materials brought in by dredging. This would provide a really spacious harbor with almost unlimited accommodation, though with the undoubted disadvantage of being completely unprotected, except by shoals, from all easterly and north-easterly gales."

The real difficulty is that of the climate, not of the Bay, which is in no sense a frozen sea, but of the Straits, through which alone egress is possible. The general conclusion seems to be that navigation is possible, though at times difficult, from about July 15 to November 15, and this will be sufficient greatly to relieve the present congestion of east bound traffic in September, October and November. Whether four months' traffic for steamers, whose bows may have to be artificially strengthened, will be profitable, is another question. That it will be tried, and that, if successful, it will for four months in the year add greatly to the breadth of the country, is undoubted. For the remaining eight months we shall apparently close up as quickly as did Alice on drinking the little bottle.

The opening up of a port on Hudson Bay would also help to relieve another Canadian disadvantage—the extremely limited available coast line. To the south we face landwards, and most of our northern boundary is in the grip of the Frost King. On the east Montreal and Quebec are closed for between four and five months, and a narrow strip of Labrador, under the rule of Newfoundland, extends along the coast for hundreds of miles. Whether Newfoundland, sitting gaunt and desolate like a fair fowl on her rock, will join the Dominion is still doubtful; but Canada should as possible take over the governance of continental Labrador. Down our west coast, however, extends the long strip of Alaska, which it is to be feared, for ever curtails our Pacific frontage. Thus though we have plenty of ports for all necessary commercial purposes, we are never likely to be a seafaring people in anything like the proportion of England or of New Zealand—a fact to be borne in mind in all considerations of a Canadian navy.

I have spoken of our river systems. No country in the world has such a network of interlocking streams and lakes. They have conditioned much of our development in the past, and are likely to play at least as important a part in the future. In the Maritime Provinces, forming as they do part of the Appalachian system, and draining into the Atlantic, the rivers, like those of New England, are of local importance only, unfair though it seems to apply this term to the St. John, with its 400 miles of varied scenery and its splendid volume of water. Our first great continental stream is the St. Lawrence, which drains the Great Lakes, and whose basin, lying largely in Canada, has an

estimated area of 520,000 square miles. From Lake Superior to Montreal there is a drop of about 650 feet, which has been surmounted by canals, and we have now a navigable route leading westward from Montreal for nearly 3,000 miles into the heart of the continent, while eastward from Montreal for almost 1,000 miles the estuary of the river and the Gulf of St. Lawrence form a direct route to the ocean for the largest vessels.

North and west of the St. Lawrence system begins the vast area draining into Hudson Bay, estimated to contain 1,855,000 square miles. The height of land bounding the Hudson Bay basin runs southwesterly through Quebec and Ontario to near the head of Lake Superior, whence, diverging southwards into the United States and again entering Canada, it follows a general westerly course to the Rocky Mountains, leaving in Southern Saskatchewan and Alberta a narrow strip of territory whose waters find their way to the Gulf of Mexico. Continuing northward for some distance along the crest of the Rocky Mountains, the divide then assumes a general northerly course, and, passing just north of Edmonton, runs to a point north of Hudson Bay. Within this basin in the west is the Saskatchewan River, rising in the Rockies and flowing easterly to the Winnipeg system of lakes, beyond which it is continued by the Nelson, emptying into the southwest corner of Hudson Bay, thus forming a river system 1,600 miles long. North of the Saskatchewan lies the Churchill River, that, with its tributaries, has a total length of about 1,300 miles" (G. A. Young, "A Descriptive Sketch of the Geology and Economic Minerals of Canada," Ottawa, 1909).

North and northwest of this great basin, and between it and the continental divide, lies an area of about 1,200,000 square miles, drained into the Arctic chiefly by the Mackenzie River and its tributaries. West of the divide lies the Pacific basin with an area of about 387,000 square miles, drained by numerous rivers breaking through the mountain ranges. In the north the Yukon, about 1,760 miles drains an area in Canada of about 145,000 square miles, and finds its way through Alaska into the Behring Sea.

"Thus with the exception of a relatively insignificant area of about 13,000 square miles, the whole of Canada lies on the northern slope of the continent, draining into the northern Atlantic, the Arctic, or the Pacific Oceans" (Young, op. cit.).

There is hardly one of these multitudinous rivers and lakes upon some part of which steamers do not ply. The St. Lawrence system has been made navigable for large vessels to the head of Lake Superior; probably the next improvement will be by canals at suitable points, to make a route navigable for large barges from Lake Superior to Edmonton, a plan which involves neither great expenditure nor any considerable engineering difficulties. In 1885, during the rebellion, a boat was launched in the Red River, sailed down to Lake Winnipeg, whence it was hauled and poled up the Grand Rapids to Cedar Lake, whence it was sailed to Edmonton.

But it is not for transportation alone that this network will be employed. Much of human progress has consisted in the finding of substitutes, and the great word now on the lips of all Canadians is power. The industrial revolution depended upon coal, and the use of coal in smelting; there may yet be another industrial revolution, due to the use of water power. Canada is not ill off for coal, but it lies mainly at the extremities. The coal of Cape Breton supplies the country as far as Montreal; British Columbia is well provided, and Alberta has store of lignite; but Ontario, the most thickly settled, and economically the most advanced of the provinces, and Manitoba, are supplied entirely by the United States. The long and expensive railway haul has tended to check our industries, or, at least in Ontario, to confine them to a few spots. Winnipeg could hardly become a great manufacturing centre with coal at over \$2 per ton. But now most of the Ontario municipalities are within sight of cheap power. Winnipeg will soon obtain it from the Winnipeg River, and already sees herself the Chicago, and more than the Chicago, of Canada. Our stores of this "white coal" are really illimitable, and stretch from Atlantic to Pacific. So far no real record of our resources has been made, but from the most reliable information at the disposal of the Commission of Conservation, it seems that the total possible horse power is about 16,000,000, of which the greater part is available, of which in 1910, only about 515,000, or less than 3 1/2 per cent, had been developed. The total import of coal into Ontario in 1909 was 8,670,505 tons. The total power available in the province is equivalent to that obtainable from about 95,000,000 tons of coal; that at present developed to about 7,285,000. In almost every part of the continent this development is possible save perhaps in Alberta and Saskatchewan, where the power, though abundant, is at some distance from the settled parts of the province.

In British Columbia the coast rainfall, and the high heads of the rivers, due to the neighboring mountains, give abundant power in spite of the small drainage areas. Thus the Vancouver Power Company has developed a site on the shore of Burrard Inlet, which maintains 22,000 h. p., though the drainage area is only about 200 square miles.

The question remains how much of this vast area is habitable? It is idle to talk of a country of 3,500,000 square miles, if the greater part of it is Arctic waste. In spite of isolated spots such as the gold bearing valleys of the Yukon, the far north of Canada is never likely to sustain a large population. The 500,000 square miles of the Arctic archipelago, though not without their value, are of less worth than a few square miles of Michigan forest. Canada can never have the same habitable area as the United States, though her combination of arable land and of water power may yet make her as great, and perhaps even as populous.

What then is the climate of Canada? The warm winds, gathering moisture on the Pa-

cific, meet the coast range, and rising lose their moisture, so that the rainfall on the Pacific slope is from 100 to 150 inches a year. As they pass inward the rainfall grows less, and the climate of the fertile valleys of British Columbia is like that of Great Britain at its best.

Southern Alberta was long supposed to be semi-arid, the northern tongue of the great American desert, and was given up to cattle raising, for which the light snowfall in winter made it suitable. Her fitness for this was increased by the well known phenomenon of the Chinook, a warm, dry wind which, coming from the mountains, often means a rise in temperature in a few hours from 20 deg. below zero to 40 deg. above, and which licks up the snow till not even a drop of moisture remains. The late Dr. G. M. Dawson, has pointed out the likeness of this phenomenon to the foehn winds of Switzerland. By the time the western winds have reached the summit of the Rockies they have lost practically their last drop of moisture, while its rapid condensation has retarded the cooling process. Rushing down the eastern slopes they are warmed by the increasing pressure, and so reach the plain very warm and very dry. This phenomenon has in all probability something to do with the treelessness of the prairie, clearing away the snow, drying the surface soil, and depriving it of its moisture just when needed by the sprouting trees. But of late years there has been a series of wet seasons, and large wheat crops are now grown. Even should it prove that wet and dry seasons recur in cycles, and that the dry cycle is at hand, much of the district is now under irrigation, and loss would be minimized.

From the point of view of population, the great question is, of course, the distance north to which wheat may be profitably grown, for though a certain degree of mixed farming is more and more the rule, and though root crops and oats will grow plentifully north of the wheat line, it may be taken for granted that for many generations the northern wheat line will mark the limit of intensive settlement. For many years wheat has been grown successfully in small quantities at Dunvegan on the Peace River, 414 miles by latitude north of Winnipeg; at Fort Vermilion, further down the Peace, 591 miles north of Winnipeg; and at Fort Simpson, at the junction of the Liard and the Mackenzie, 818 miles north of Winnipeg. This is due to the fact that during the growing months the insolation scarcely varies between the parallels of 40 deg. and 60 deg., the larger number of hours that the sun is above the horizon very nearly balancing the effect of less direct solar radiation. To this is added the low altitude, Prince Rupert being nearly 500 feet lower than Regina, and Stanley on the Churchill 260 feet lower than Prince Albert. Thus the mean temperature at Calgary, Edmonton and Fort Chipewyan is alike 59 deg.; at Dunvegan, 58 deg.; at Fort Simpson 57 deg.

Thus it is noticeable that the summer isothermals, like the railways, radiate north from Winnipeg. There seems no reason, either in

climate or in soil, why the greater part of the west should not support a large population at least as far north as the 60th parallel.

And even though intensive settlement stop here, the wooded area extends far to the north and as cultivation pushes on so too will the fringe of lumbermen, which has always in Canada been thrown in advance. For its continental climate, its adequate rainfall, its fertile soil, have made Canada a land of forests; this I can best illustrate by the accompanying diagrams.

Yet Canada is a stern land, a land where save on the extreme western coast the winter is long and bitter. Yet this hard winter is perhaps our greatest asset. In wheat growing the frost takes the place of rain. In winter the ground freezes hard and deep. As soon as four or five inches have thawed, the spring wheat is sown. All through the late spring and rainless summer the ground thaws deeper and deeper, and the warm moisture comes up about the roots of the wheat.

From the national point of view our climate kills out the unfit with grim efficiency. We are not likely ever to have a negro problem; it is doubtful if the most misdirected philanthropy will avail to keep alive the submerged tenth. Canada is not without the tramp and the wastrel; but the unemployed can never remain in sufficient numbers to become a national problem. The English climate chills but does not kill; in Canada the waster, as a class must work, emigrate or die.

But man cannot only build railways and deepen rivers; he can even alter climate, or at least the effects of climate. In Western Canada, as cultivation increases, the Frost King flies before the plough. Not merely does the grain become acclimatized; as the land is broken up, the rays of the sun are stored instead of being rebuffed by the unyielding prairie turf. So much warmer does the soil and the immediate layer of air remain through the night, that in Alberta the frosts do not begin to injure the wheat till a full fortnight than they did a generation ago. In the northern regions, where every day is precious a fortnight gained in early September is of national importance.

But man's work can change the climate and the geographical conditions for evil as well as for good. In many parts of the United States and of Canada, the reckless clearing of the country by woodsmen and the still greater loss by prairie fires have left the soil bare. Further fires destroy the vegetable mould and, moss which lie shallowly enough upon the bare rock. Not only is the country denuded of trees and of soil, but the rainfall is altered, and the equable flow of the rivers is changed into a series of destructive freshets in spring and undue low water in summer and autumn. Our loss has been greatest in the unsettled forests north and northwest of Lake Superior. To quote from the address of Prof. J. W. Robertson before the Commission of Conservation, "This wilderness of rock and lake and forest is Canada's great regulator of climate for ensuring regular and dependable rainfalls in summer, and if that vast area be burned over and left bare, the winds sweeping over it will go where they list, licking up the moisture instead of dropping down refreshing showers." (Report for 1910, p. 44.)

Fortunately much of the land in question, and especially that at the headquarters of our great rivers, is still in the possession of the Crown, whereas in the United States many of the Appalachian streams are endangered by private ownership of the forests at their headwaters. Taking warning from her neighbor, Canada has, before irremediable damage had been done, established a Commission of Conservation, in whose work the Dominion, the Provinces, and the Universities are co-operating. The first report published in 1910, reveals at once the greatness of the loss already incurred, the imminence of greater danger, and the vastness of the heritage remaining. Perhaps its most striking feature is the fragmentary state of our inventory. Much is known, but more remains conjectural. "To realize the unprospected nature of the country," says Mr. G. A. Young, of the Geological Survey, "it is only necessary to remember that the greatest asbestos deposits of the world were brought to notice by blasting the Quebec Central railway through them; that the greatest corundum deposits, extending in a belt a hundred miles long, were found in a settled district by an officer of the survey only twelve years ago; that the Sudbury nickel deposits were discovered by putting a railway through them; that Cobalt, now the premier silver camp, although only a few miles from a silver-lead deposit known a hundred and fifty years ago, was discovered less than six years ago, and then only by means of a railway cutting through a rich vein." (op. cit., p. 19.)

But though much remains to do, much has been done. We have built railways and dug canals, and conserved water power, in the resolve to make a nation out of these fragments, geographically so discrepant. When Englishmen ask us wherein we differ from the Americans, or when genial Presidents of the United States tell us that we are at the parting of the ways, do you wonder if we feel like telling them something of this. So far we have come, and to complete nationality we intend to go, within this British Empire, unless you cast us off; but within or without it, as Canadians. Our boundaries may be artificial, our outlook often at first sight provincial; but go below the surface and you will find that the spirit which urges us on today in our work of conquering geography is the spirit that declares that Canada shall be one, one from ocean to ocean. Demosthenes.

\$75,000 Towards a Well-bred People

Lord Rosebery and Principal Miers and others have issued an important appeal for £15,000 to build a Francis Galton Laboratory for the Study of National Eugenics on a site given by London University.

"The aim of the science of Eugenics," says the London Times, quoting Professor Karl Pearson—who is to control the new Eugenics Laboratory—"is to produce a nation which, in every sense of the term, shall be well bred, free, as far as may be possible, from inherited defects, and retaining the largest possible proportion of ancestral merits. The great obstacles to the fulfilment of this aim, in the twentieth century, arise from the social conditions which permit the unchecked multiplication of the unfit, and which tend, from considerations supposed to be prudential, to limit the productiveness of the wiser and stronger portions of the community. Professor Pearson raises the question whether such limitation does not defeat its main object, even in the case of single families, and it is impossible to doubt that it is eminently prejudicial to the nation as a whole."

Case for Big Families

"The old English tradition of the frequent success in life of the members of large families, taught by circumstances to be helpful to one another, and to make the best of things, or the other tradition that the way to get a good wife was 'to take her out of a bunch,' were surely not altogether delusions; and it is at least certain that they largely governed the national conduct throughout periods of history, when England was not ashamed to speak with her enemies in the gate," says the Times. "In contrast to this, Professor Pearson describes as 'startling the conditions of America, where the classes which take an academic education as their standard are not reproducing themselves, the average number of their children being less than two; or the state which Mr. Sidney Webb describes in another intellectual circle in this country, an almost childless population with no inheritance of its ability, as opposed to the maximum fertility which is reached by the degenerate stocks. Such conditions as these appeal to all who witness them."

Lord Rosebery's appeal says that "Sir

Francis Galton, in leaving the residue of his estate to the University of London for the endowment of a Professorship and Laboratory for National Eugenics, expressed the wish that the university would see fit 'to preserve the capital thereof wholly, or almost wholly, intact, not encroaching materially upon it for cost of building, fitting, or library.'

"The university believes that the present moment is an opportune one for the issue of an appeal, not only to the friends and admirers of its benefactor, but to the wider public which realizes the growing importance to the nation at large of the ideas associated with the name of Sir Francis Galton. The fittest memorial to his life is essentially the fulfilment of the project he had most closely at heart—the establishment of an institute for the study of those agencies under social control that may improve or impair the racial faculties of future generations physically and mentally."

"Already influential movements are on foot for the academic recognition of Eugenics and the establishment of similar laboratories in both America and Germany, and in the case of the former country there is small doubt that the funds required will be forthcoming as soon as an appeal is made."

"It seems probable that legislation in future will deal largely with social problems; it is essential that the statistical facts on which such legislation may be based shall be analyzed in a purely scientific manner by workers who can give time and energy to investigation, quite independently of any ulterior end or party bias. Already the laboratory is consulted very largely by medical officers of health, by school medical officers, and by independent medical men engaged in statistical problems who have not a staff adequate in numbers and training to deal with these matters. The work of the laboratory in this direction already supplies a national need."

Plenty of Work to Do

"There can be no doubt that the laboratory has plenty of work before it of important social value. At the present time it is in possession of material, received from educational and health authorities in all parts of the country which alone would require three or

four full years' labor for the existing staff to analyze and publish, and the bulk of it has direct bearing on the most important social and national problems of the day. It is essential that at the earliest possible date the members of the staff should be placed in conditions more favorable for carrying on their work than those which at present exist."

A STRANGE SCENE

An advertisement in the London newspapers for "One hundred clean old men with long grey or white beards and one hundred with bald heads," wanted for Professor Reinhardt's production of "The Miracle" at the Olympic, resulted in an extraordinary scene at the Clavier Hall, off Hanover square.

All morning the square was packed with bearded patriachs who strode or hobbled or were led to the hall. All the world seemed to have grown old. Hundreds of old men, many of them poor, starved looking creatures, came eager and expectant, with the hope of earning seven and a half dollars a week. And for once it was a time when age and weakness triumphed and when the younger men had to stand down.

Nearly all had sad stories of misfortune to tell, and pitiful were their pleadings for the "job."

"My beard is not much today," said one, "for I have just had it clipped. Give me a chance; it will grow before Christmas." He got it.

Another who had been rejected was going disconsolately out when he heard a young voice singing the "Jewel Song" from "Faust." He straightened himself up, and rushing back to the examiner's room cried, "I'm an old professional. I've often sung in 'Faust,' and—I want a job." It was "The Fallen Star" in real life, and the manager relented.

Herr Reinhardt wants to have everything real in his production, and that is why he is collecting an army of shiny-pated stage debili-

For the sower of the seed is assuredly the author of the whole harvest of mischief.—Demosthenes.