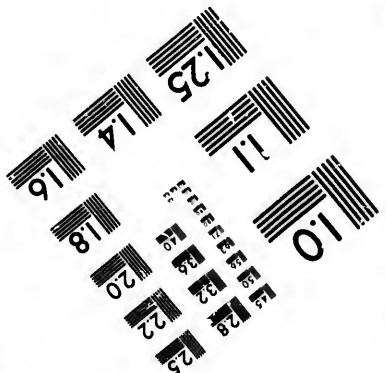
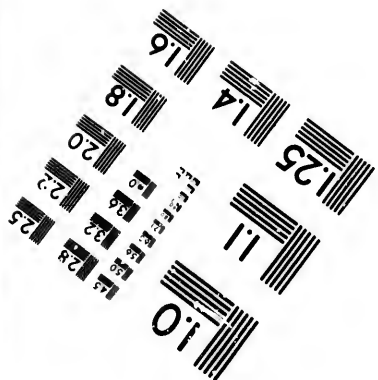
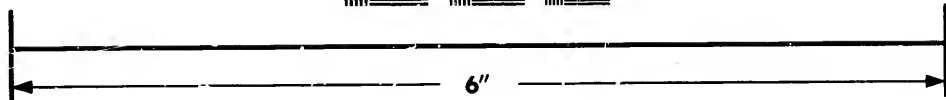
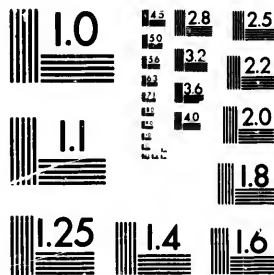


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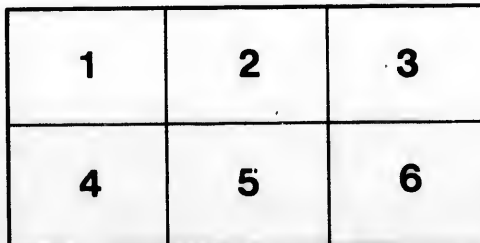
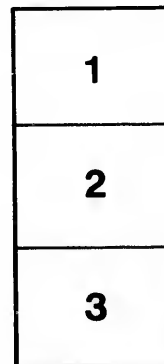
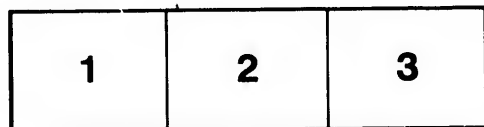
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# Central Canada Business Extension League

TORONTO PROVISIONAL COMMITTEE ROOMS,

10 King Street West.

**T**HE FOLLOWING ADDRESS is published by this League as a means of promoting the object of its organization, which is to secure immediate continuous commercial transit between the navigable waterways of the St. Lawrence, the Hudson the Mackenzie, and the Yukon Basins.

THE EFFECT OF THIS WILL BE to concentrate at points in Ontario and near by Cities a large share of the immense outfitting trade now enjoyed on the Pacific coast, and to open an outlet for the surplus products of the vast Mackenzie Basin which cannot be profitably marketed except by the Hudson Bay route.

To the text of the Address is appended the minutes of the meeting at which it was delivered as reported in the *Toronto World*, April 3rd, 1898.

The main hall of the Canadian Institute was well filled by a select audience on Tuesday night to hear Mr. J.W. Tyrrell's address, which is presented in these columns as one of the most important ever delivered to a Canadian audience.

Professor McCallum, President of the Institute, on taking the chair, remarked that the lecturer was one who had made a record as an explorer, having spent two seasons in meteorological observations north of Hudson Straits, besides his most hazardous canoe voyage through the great Telzoa River region and Chesterfield Inlet, to and along the western coast of Hudson Bay, to Churchill River, and thence to Manitoba, and his observations of these regions would be received in scientific and geographical circles as worthy of the entire con-

fidence which the well-known ability of Mr. Tyrrell would inspire.

## MR. TYRRELL'S PAPER.

### **Navigable Waterways of the Four Great Interior Basins of Canada, and the Economics of Utilizing Them in the Formation of a Joint Mid-Continental Transit System.**

The interior waterways of Canada which can be utilized to any great extent may be classed as belonging to four basins, namely: The St. Lawrence, the Hudson Bay, the Mackenzie, and the Yukon. It will be my aim to note the outlines of these basins and their main waterways, and the points where

they can be most readily connected by railways across their divides. Next to mention some of their most prominent economic resources, and the advantages which Central Canada may reap from securing an early development of such waterway system.

The term Central Canada is intended to include Montreal on the east and Winnipeg on the west, and the districts of which they are the commercial centres, as well as Ontario in its entire area.

#### ST. LAWRENCE BASIN.

The geographical characteristics of this basin are too well known to require extended notice. The economic lessons to be gathered from its commercial development are, however, worthy of note. One hundred years have not yet elapsed since steam transit was first seen upon its waters, and half a century has not passed since steam railways reached its main channels. But to-day its marine tonnage exceeds that of the entire world in the 18th century, and that passing through the canals of one of its rivers (the St. Mary's) in seven months of 1897 was more than double that going through the Suez Canal at the junction of three continents in that entire year. The lesson to be drawn from these results is that while land transit has made marvelous strides in expediting quick conveyance of persons and property in this basin, waterways more than hold their own as the cheapest, for the most bulky commodities, where long distances are available for large-sized craft without breaking bulk between terminals.

#### HUDSON BASIN.

Less than three hundred miles north from the largest lake in this great waterway occurs tidewater upon the Hudson Basin. Although navigable waters of its southern rivers reach to within less than one hundred and fifty miles of the main line of the Canada Pacific Railway, yet there is not a road, nor even a path, from one basin to the other. Canoe, or boat transit only is utilized up to this time. Although commerce was established in both these basins more than two and one-quarter centuries ago, no regular governmental mail service exists between their main water courses from any direction. This is a very remarkable condition of affairs, and one not creditable to Canada. The explanation generally accepted is that, as the trade of Hudson Bay remains in the control of one corporation known as the Hudson Bay Company, and its interests are no doubt best sub-

served by keeping it as isolated as possible, a systematic repression of industrial development and of improved transit facilities has been pursued with effective results.

This company, by virtue of its charter powers, under English laws in past years, exercised quasi-legal jurisdiction over the three most northern basins, but this was circumscribed when British Columbia was organized as a province in 1858, and in 1869 the company surrendered its special privileges in consideration of the sum of £300,000, and a grant of one-twentieth of the land in what is known as the "fertile belt," mainly in the valley of the Saskatchewan. In maps published as late as 1866, the company's possessions were shown as comprising two-thirds of the whole of Canada. Prior to 1858 the proportions were (see Colton's Atlas), Hudson Bay Company possessions 2,250,000 square miles, organized provinces 847,174 square miles. The company now has the status of a trading corporation solely, and others are at liberty to engage in business operations on Hudson Bay or elsewhere if so disposed.

That commerce will develop rapidly with easy transit to and from those shores is certain, and also that the Province of Ontario will have greatly extended commercial resources made available upon the advent of a railway to its northern sea coast.

Six thousand miles of inland sea shore lines will become commercially tributary to it with vast stores of diversified wealth.

Hudson Bay and its estuaries have a superficial area of over 500,000 square miles, or more than five times that of the Great Lakes added together. It is fed by six of the largest rivers on the continent, the Nelson and tributaries ranking next to the Mississippi, Mackenzie and Yukon. One unfortunate peculiarity of the bay is the shallowness of the coast of the southern portion, and the scarcity of natural harbors, of which not one exists on the west shore between the Moose and Churchill Rivers, a coast line distance of over 1000 miles. Tide water extends south on the Moose River for about twenty miles. The entrance is obstructed by a sand bar, upon which there is five feet of water at low tide, and about fourteen feet at high. To secure a good harbor here will be an expensive though not an impracticable undertaking.

None of the rivers emptying into Hudson Bay present specially favorable features as commercially valuable waterways, but in scanning a map of

that sea coast the eye is at once attracted to the position of the estuary known as Chesterfield Inlet. Extending westerly from the northwest corner of the bay, it seems like an arm stretched out to grasp one from the Mackenzie basin projecting eastward to meet it in the contours of Great Slave and Clinton Golden Lakes with a large river known as the Telzooa winding between them.

Chesterfield Inlet proper is a deep fiord like those of Norway, with a width of from 2 to 10 miles, and extends westward about 140 miles to where an island divides the same into two deep but narrow channels, which connect with another expanse called Baker Lake, extending 70 miles further to the west, and ranging from 20 to 30 miles in width. Baker Lake is not affected by tides like the inlet, and its water is fresh, being fed by several great rivers, of which one known as the Telzooa it has been my lot to explore for a distance of over 600 miles.

Ascending this river from Baker Lake, into which it flows through a broad, shallow delta, there is found an unobstructed deep river channel for a distance of 30 miles, at which point two slight rapids occur. Passing these, there exists a further distance—120 miles—of unobstructed river navigation, which takes us to the confluence of the west branch of the Telzooa, a stream that is destined to become an important factor in the establishment of a through route from Hudson Bay to the Mackenzie River, inasmuch as it not only tends to form a water connection between the two great systems, but its valley affords an inestimable boon for that district, in the shape of a timber supply.

This was clearly proven to me by the quantities of well preserved drift timber, none of which had come down the south branch.

The exact locality of this large and interesting river is unknown, since its course has never been explored, but because of the two confining adjacent river valleys the course of the west branch must be about southwest as shown upon the map in dotted lines—and hence must have its source somewhere in the direction of Clinton Golden or Great Slave Lakes.

To what extent this river may afford navigable facilities it is impossible to state, but judging from the well-preserved condition of bark on its drift wood, it is pretty certain that few, if any, rapids occur between the forks and the forest area. At any rate, the distance in an air line from the forks of Telzooa,

to the waters of Clinton Golden Lake cannot be more than about 160 miles.

Leaving the question of the width of the divide to be settled by future examination, let us consider what are the adjacent water-courses on the other side.

#### MACKENZIE BASIN.

At the eastern end of Great Slave Lake we will find ourselves at the apex of a system of waterways, the equal of which does not exist on the globe.

The lake itself, which is about 400 miles in length, you will notice on the map, has a very peculiar area, being much broken by long islands and peninsulas and having a narrow arm of over 100 miles long, extending north almost at right angles to its general course. Its waters are pure and deep, having been sounded in places with an 80 fathom line without touching bottom. Its narrowness and curved outlines preclude the liability of navigation being impeded by wind and waves as severely as on the great lakes of the St. Lawrence basin, and render it peculiarly favorable to the employment of freight barges such as are at present employed upon similar waterways in more southern latitudes.

Proceeding westward three grand trunk waterways are presented, namely: Via the Mackenzie River, northward; via the Liard River westward; via the Slave River southward.

We can at the western end of the lake proceed northward for 1100 miles on the second largest river on the continent, until we reach the Arctic Ocean, whence in a short summer season ships can proceed into the Pacific Ocean through the Behring Straits. As many as 30 have made the passage in a single season in pursuing the whaling trade, which in one year yielded nearly two millions of dollars of value in whalebone when that route was first exploited. We shall then have gone 1500 miles from our starting point, and will have found no obstruction to the passage of a large steamer. By changing our course at the Mackenzie delta and entering the Peel River we can reach the shortest divide from navigable waters in the next, the

#### YUKON BASIN.

This contains the third longest riverway on the continent, upon which and its navigable branches a steamer can convey us for 3000 miles, of which branches the Porcupine is the most important, being navigable from the point nearest to the Peel River. This basin we need not take space to describe at length, since its characteristics have been so fully made known of late by



Mr. Ogilvie's book and by multitudinous press notices of explorations by gold hunters and others of recent date. Suffice it to say that the divide for railway purposes does not exceed 60 miles.

Returning to the Mackenzie basin and our starting point at Great Slave Lake, we can follow the Mackenzie River for a couple of hundred miles westerly from the lake, and then enter the magnificent Liard River bearing to the south and west, and find, as Mr. McConnell reports, an uninterrupted navigable channel (except that for ten miles near the confluence with the Mackenzie some special aid for steamboat transit may be required), for 220 miles to the mouth of the Nelson branch, which is also navigable for over 100 miles south to a Hudson Bay Company post, and was, as he mentions, reported by a mining exploring party to be of the same character for a long extension southward.

From that branch the Liard continues navigable for about 60 miles west, when canyons and portages occur at intervals, which Mr. McConnell found to aggregate about 7 1-2 miles in length, but some of which he concludes might be avoided on closer examination. With these exceptions, the river is navigable to the forks at the mouth of Dease River, 160 miles westward. At this point three routes diverge, which are worthy of special notice.

The first, or southern line, is via Dease River, 140 miles to Dease Lake, the river being reported by Professor Dawson as navigable for large boats, and on the lake, which is 26 miles long, steamers are already in use. Thence a railway route has been chartered to reach Glenora on the Stikine River, an air line distance of 60 miles, from whence 150 miles of river navigation reaches Fort Wrangel on the Pacific coast. You will see that on this route the width of the "divide" between the navigable waters of the Pacific and Mackenzie basins is but three score miles, or less than two hours of railway transit time.

The next, or western route, is from the Liard Forks to the eastern end of Teslin Lake where the McKenzie and Mann line of railway is to have its northern terminus. The air line distance across the "divide" is, as shown on large map, 104 miles.

The third, or northern route, is to follow up the Liard River to the series of lakes near its source, and which together present a water course of 170 miles, a large portion of which is capable of steamer navigation. From the

western extremity of Lake Finlayson to a navigable section of the Pelly branch of the Yukon is shown on the large map to be only about 20 miles, while for canoes it is much shorter. Prof. Dawson went over this route in 1887, by following up the Pacific coast to the Stikine River, thence to Telegraph Creek, crossing the portage to Dease Lake, then down the Dease River to the Forks, thence up the Liard to Lake Frances and across to the Pelly, thence down the Yukon and back by the Chilkat Pass to the Pacific. He gives the width of the Liard above the forks of the Dease as 840 feet, a channel depth of seven feet, and the rate of the current is 4 1-2 miles per hour.

The aggregate of the sections of the Liard and branches and connecting lakes, which can be navigated by steamers of various sizes, can be estimated at 300 miles west of the Forks and 520 miles east of the same, including 100 miles upon the Nelson branch. To what extent continuous navigation may be established by overcoming obstructions between the levels can only be determined by more accurate surveys.

The forks of the Liard are about 1100 miles from the east end of Slave Lake, and this may be designated as the western route.

Returning to our eastern starting point in Great Slave Lake, we can examine the more southern routes, by seeking the entrance of the Great Slave River, 200 miles distant, and passing up its broad and deep channel by steamer without obstruction 160 miles to its midway rapids. Here its waters descend 242 feet in a distance of 15 miles, around which portage the Hudson Bay Company has a roadway for the transfer of passengers and freight from its steamer plying below the rapids to one above the same, employed in the Athabasca River trade.

Once beyond this portage we can pass up the Slave River for about 70 miles to the mouth of the waterway known as the Peace River. Along this a steamer can proceed with but one slight obstruction at Vermillion Falls to the foot hills of the Rocky Mountains, 750 miles distant. Then intervenes 12 miles of rapids, wherein the river falls over 1000 feet. This portage passed, another navigable section of the river 150 miles long awaits us, where is a channel ample for large steamers to pass to the southern end of McLeod Lake in deep, placid waters embosomed on the Rockies when rise in domes on either side a mile or more in height, and affording some of the grandest scenery on this continent. Thus we have in one river 900 miles

of navigable water, broken only by two portages of about 13 miles in length, and from its mouth we can go easterly 430 miles to the place of starting, or 1330 miles in all.

There is another route still further south, to follow which we leave the mouth of Peace River and pass south on the Slave River 20 miles to an arm of Athabasca Lake, but instead of entering the lake, ascend the Athabasca River southerly and westerly to Fort McMurray, 160 miles; thence to the head of the Grand Rapids is about 87 miles, and within this distance 11 sepa-

the Slave River route, making the total waterway distance via Slave River 1830 miles. To this we might add 100 miles probably navigable on the Williams and Hay Rivers, and 30 miles on Clearwater River, together with 210 miles on Lake Athabasca, making a total of 2170 miles of navigable waterways on the most southern routes. The aggregate lengths of the waterways of the Mackenzie basin are as follows:

Mackenzie River .....	1100 miles
Liard, including Nelson and	
Dease branches .....	820 miles
Slave River .....	250 miles



PHOTO OF ATHABASCA RIVER, TAKEN AT THE LANDING, 90 MILES NORTH FROM THE C.P.R., AT EDMONTON, 1898.

rate rapids, aggregating probably as many miles of more or less formidable character occur, the greatest being the Grand Rapid at the head of the series, where the Hudson Bay Company employs a tramway for the transportation of goods, which are carried over the remainder of the river in 10-ton scows.

From Grand Rapids to Athabasca Landing the distance is 165 miles, whence a road leads to Edmonton, a terminus of the C.P.R., 90 miles distant. But by continuing up the river 100 miles to Little Slave Lake and adding its 75 miles, now traversed by steamers, we have 500 miles to add as a branch to

Peace River .....	900 miles
Athabasca River .....	500 miles
Williams, Hay and Clearwater	
Rivers, say .....	130 miles
Great Slave and Golden	
Lakes .....	400 miles
Athabasca Lake .....	200 miles
Total in Mackenzie basin..	4300 miles
Yukon River and tributaries.	3000 miles

Total for two western basins .....

The portages occurring within and connecting these basins via the Peel River route aggregate about 150 miles.

Crossing the portage of say 160 miles, to navigable waters in the Hudson basin we shall have steamer conveyance to Moose River, a distance of about 1300 miles, and up the river 100 miles, making a total in Hudson basin of 1400.

From the head of navigation on Moose River to the C.P.R. at or near Mississauga, is by air line route of 122 miles, or from tide water 236 miles. Thence the C. P. R. is available to Heron Bay on Lake Superior, where ample shipping facilities are already provided. Thence an uninterrupted waterway exists through five lakes, two rivers and two canals to the docks at Toronto, 1000 southeastward.

The grand total is therefore as follows: In St. Lawrence basin, Heron Bay to Montreal, waterway 1350 miles, 122 miles new section divide portage railway, via Mississauga to Moose River, Hudson basin, waterway, 1400 miles; 160 miles new divide portage railway to Mackenzie basin; Mackenzie basin, waterways, 4300 miles; 83 miles portages around obstructions in watercourses; Yukon basin, waterways, 3000 miles; 60 new divide portage railways; total new railways 425; total waterways 10,050 miles.

All this exists in Canadian territory including the Canadian "Sea" and the Welland Canals, except about 1000 miles of the Yukon and its Porcupine branch, the free navigation of which, however, is secured to Canada by treaty with the United States.

With the exception of Russia and possibly the United States, no other nation on the globe can rival the rich inheritance which nature has bestowed upon Canada in her vast interior waterways, which I have not attempted to exhibit in their full measure, but have omitted the eastern section of the St. Lawrence basin, and also part of the Hudson basin, including Winnipeg and sister lakes, the Albany, Saskatchewan, Assiniboia, Red, Nelson and other rivers more or less navigable.

Having thus glanced at the extent of the navigable waterways system the next feature to be considered is:

#### STEAM NAVIGATION IN THE HUDSON BASIN.

Hudson basin has no commercial steamer service other than that of the Hudson Bay Company for its own business exclusively. The Dominion Government, with an appropriation of \$100,000, sent three annual expeditions by chartered steamers under the command of Lieut. Gordon, R.N., during the seasons of 1884-85-86, which were mainly

engaged in making examinations of Hudson Straits to determine the length of the season of navigation there. In this work I was engaged during the years 1885-86, being stationed at Ashe Inlet through the winter season.

During the year 1897, \$30,000 was expended by the Dominion Government for the same purpose, and a voyage of the steamer Diana was made, with what results we have not yet been officially informed. The conclusions of Commander Gordon were that from three to four months of safe navigation through the straits were all that could be relied upon. From my two years' personal observations at Ashe Inlet, I am of opinion that the straits are navigable for about five months, viz., from July 1 to December 1. In Hudson Bay itself more favorable conditions prevail. Navigation in the Moose River opens about May 1, and does not close until about Nov. 20.

The average maximum temperature at Fort York for 10 years preceding 1884 was as follows: May 73.5, June 93, July 98.5, August 85.1, September 68.4, October 45, November 34.3.

The average 2 p.m. mean temperature for the corresponding months of the same period was as follows: May 34.17, June 50.67, July 61.99, August 57.68, September 45.55, October 30.30, November 11.69.

Lieut. Gordon found the temperature of Hudson Bay in the latitude of Churchill River to average over 40 degrees, while in the straits it was 32, or 8 degrees colder. He says in his report for 1884, page 200:

"Hudson Bay may, therefore, be regarded as a vast basin of comparatively warm water, the effect of which must be to considerably ameliorate the winter climate to the south and east of it. The resident factor at Churchill informs me that the bay never freezes over so far out from shore that clear water cannot be seen, and the temperature of the water must be above 29.08 Fahr., the freezing point of salt water, where at the same time the temperature on shore is below zero."

The average depth of the bay ascertained by soundings made across it opposite Fort Churchill is 94 fathoms, or 564 feet.

Gordon's report of 1886 also contains a table showing the relative prevalence of fogs on the bay and straits compared with the Straits of Belle Isle, through which the Montreal and Quebec steamers pass to cross the ocean.

In July, 1886, at Belle Isle Straits there were 368 hours of fog. In July, 1886, at Ashe Inlet, H.S., there were

92 hours of fog. In August, 1886, at Belle Isle Straits there were 104 hours of fog. In August, 1881, at Hudson Straits there were 88 hours of fog. In September, 1886, at Belle Isle Straits there were 136 hours of fog. In September, 1886, at Hudson Bay and Straits there were 26 hours of fog.

Thus disproving the general impression that Hudson Bay and Straits have an unusually foggy atmosphere.

To sum up the status of steam navigation in the Hudson basin, it can safely be stated that while there is not a single steamer wintering there or employed coastwise thereon, navigation can be maintained for nearly as long a season as on the Great Lakes, except perhaps at Chesterfield Inlet, where the date of the opening of navigation has not been determined, though it would doubtless be several weeks later than at Moose.

My brother and I were greatly impressed when exploring Chesterfield Inlet with the navigable advantages presented by it. Also with the lakes and river connections beyond it, on the west, through which we passed on our way to the sea coast.

Since then the "Harvey route" has been projected to utilize these in connection with the Mackenzie basin water courses, by means of a railway across the divide, and I regard this as a magnificent enterprise.

In the Mackenzie basin steamers in the service of the Hudson Bay Company have made annual trips from the rapids of the Slave River to the Arctic Ocean, also above the rapids of the Slave to rapids of the Athabasca, and also above the latter to Little Slave Lake. Other steamers are expected to be placed on these reaches this season.

Reliable data show that all the great rivers in the Mackenzie basin commence a break up of the ice at their sources in the mountains about May 1, and during that month the process is completed on the great Mackenzie to the Arctic Ocean.

The Dominion Senate Committee report, page 10, contains the following:

"Latitude has no direct relation to summer isothermals, the spring flowers and buds of deciduous trees appearing as early north of Great Slave Lake as at Winnipeg. St. Paul and Minneapolis, Kingston or Ottawa, and earlier along the Peace, Liard, and some minor western affluents of the great Mackenzie River, where the climate resembles that of Western Ontario."

Mr. McConnell of the Dominion Geological Survey, in his report of 1891, pages 86, 87, and 88, graphically de-

scribes the process of spring ice breaking which he saw at Fort Simpson at the junction of the Liard and Mackenzie on May 18, 1888. He says:

"Northward flowing rivers like the Liard relieve themselves of their winter fetters in a somewhat peculiar, but forcible manner. The influence of advancing spring is first felt at their sources, and as they break up there the fragments of ice float down until they come in contact with the firm ice, where dams are formed behind which the water accumulates until it acquires sufficient power to burst the icy barriers and in the on-rush of the escaping flood the river is cleared for some miles below. Another ice dam is then formed and broken in turn, and the same operation is repeated at intervals all the way to the sea.

"The breaking up of the ice at the junction of the Liard and the Mackenzie is well worth witnessing. The first shove occurred at noon and was announced by a dull roar coming from the direction of the 'Gros Cap.' On hurrying out, we found that the Liard ice which a few minutes before had formed an unbroken sheet, was now crushing into fragments and was moving slowly forward. Huge cakes of ice under the enormous pressure were constantly raising themselves on end and falling and the whole mass urged forward by the terrible energy of the piled up waters behind was battering a way across the Mackenzie. The ice of the latter fully five feet thick, firm and solid as in midwinter, was cut through like cardboard, and in a few moments two lanes were cut across its entire width (nearly two miles), before the force of the rush was exhausted and the movement ceased. In the afternoon the crashing of trees was distinctly heard. At midnight the dam at the mouth of the Liard gave way, and the massive crystal structure was hurled by the liquid energy behind it with such force that the whole sheet for some miles below the fort was crushed into fragments by the impetuosity of the assault. The velocity of the stream gradually diminished as the river became choked below by cakes of ice and soon ceased altogether. The situation on the island (upon which the fort was located) was now somewhat critical, as on the strength, or, rather, weakness, of the newly-formed dam depended our safety. If it was possible to withstand a pressure of a 40 feet

head of water—a no uncommon event—the island, from which there was no escape, would be submerged.

"Slowly but steadily the water with its icy bounds, crept up the slopes until the crests of the icebergs peered ominously over the banks. An instant of anxious suspense followed, during which the water rose to within a foot of the level of the fort, and then, to our intense relief, the dam below was broken. After the 'shove' the water fell quickly and all danger of a flood was over."

This process cleared the river to Fort Wrigley, 133 miles north, by the 18th; to Fort Norman, 184 miles, on the 19th, to Fort Good Hope, 174 miles, on the 21st, and to the Arctic Ocean, 320 miles, a few days later.

By this majestic display of the forces of nature let loose by the summer sun, the rivers of that basin are rendered navigable from year to year. The lake ice is, however, not subject to this upheaving force, but is displaced later by continued solar heat, wind and wave forces. Great Slave Lake, being narrow in its eastern section, gives little opportunity for wave force and hence is the last to open.

Mr. McConnell says that the disruption of the ice there takes place about July 1, but sometimes occurs as early as June 20, and as late as July 10. The lake is usually ice-bound by Nov. 15.

This, however, is measured by canoe navigation, to which thin ice is as effectual a barrier as thicker. But when heavy steam craft are employed several weeks will be added to the navigable season, which may thus continue from June 1 to Nov. 20, or over five months, and the rivers from May 20 to Dec. 1, or fully six months.

The next features to be considered are the available points of connection between the waterways of the Mackenzie with those of the Yukon basin. There are at least three possible portages for steam transit. One is across the "divide" between the Peel River branch of the Mackenzie and the Porcupine branch of the Yukon. For canoes the "divide" is but a very few miles wide; but for railway purposes about 60 miles, as shown on the map. Mr. Ogilvie, in passing over this route, estimated its altitude at 1200 feet above the water, and states that an average grade of 55 feet to the mile is obtainable.

The Porcupine is itself a noble river of about 400 miles in length, and its sources are within 30 miles of branches of the Yukon inside the boundaries of

Canada. It is probable that a convenient point of overland trail route from it to the Klondike may be found in the course of further explorations.

The other portages, 600 miles further south, have already been mentioned, namely, via Lake Teslin down the Hootalinqua branch of the Yukon and also via Lakes Frances and Finlayson, where is the narrowest divide between the two basins, by connection with the Pelly branch of the Yukon. Dr. Dawson reports the latter to have in that vicinity a width of over 300 feet, with a depth of four feet and a moderate current. Some shallow rapids were noted, which would more or less impair steam navigation on the upper section, but the main part of the water course as being favorable therefor.

Thus we find that the great interior waterway system of Northwestern Canada extends on the east to within a few score miles of Hudson Bay and a clear waterway via the Straits to the Atlantic. On the north it extends to the Arctic Ocean. On the northwest by a 60 mile portage to the Yukon basin and Behring Sea. On the west to the Yukon by two routes, and with the Pacific by a portage route by Stikine River.

Thus three oceans and two seas, including Hudson Bay as one, can be brought into touch by, say, 300 miles of portage railways, and the whole of this vast system may be connected with the St. Lawrence waterways, with its five great lakes and a coastline of 7000 miles, culminating at the confluence of the St. Lawrence waters with those of the Atlantic Ocean, by the construction of one remaining link, i.e., a railway from some point on the Canadian Pacific to Moose Factory, which road need not be more than 250 miles in length.

Meanwhile a temporary connection can be made as previously shown via Heron Bay on Lake Superior over the C.P.R. to Missanabie, 128 miles by a railway already provided. Thence in a line of 122 miles of new railway on an air line is only required to reach a navigable section of the west branch of the Moose River, connecting with tide water, as set forth in the report of W. A. Charlton, Provincial Commissioner, published by the Ontario Government the present year.

The grand divisions of Canada's waterways and their divide connections may be summarized as follows:

St. Lawrence basin, navigable coast line distance 7000 miles; Hudson basin, navigable coast line distance 6000 miles; Mackenzie basin, navigable lake and river distance 4000 miles; Yukon basin, navigable river distance 3000 miles; total

20,000 miles. Divide connections between St. Lawrence and Hudson basin 250 miles; between Hudson and Mackenzie basin, 160 miles, between Mackenzie and Yukon basin, 60 miles; total 470 miles.

Of the prominent industrial and commercial resources dependent upon this waterway system for development I will mention but a part and very briefly, as follows:

FIRST, tourist patronage. Large revenues will be realized by well-organized and equipped passenger transportation lines on these waterways, when the great summer touring class become

No other routes can compare with these in that respect. Some features I can relate from personal observation.

The "Barren Lands" south of Chesterfield Inlet are frequented by hundreds of thousands of reindeer. I have seen at least 10,000 in one drove. They migrate far to the north of Hudson Bay in countless numbers where the musk ox is also to be found in greater number than in any other district. In the Liard River region moose are reported to be more plentiful than in any other section of the continent.

Twenty-seven species of fur-bearing animals exist in Northern Canada. The Senate Committee of 1888 report the fur offered for sale in 1887 by the Hudson



CANADIAN HERD OF REINDEER.

Photo by Tyrrell, taken in "Barren Lands," July 30, 1893.

aware of their attractions both for scenery and for sporting privileges.

The trip through the Liard Valley and connecting with the Teslin Lake or Pelly branch routes along the Yukon must become in due time one of the most attractive on the continent. The scenery near the divide between the head waters of the Liard and Pelly Rivers Dr. Dawson refers to in his testimony before the Senate Committee as follows:

"Few lakes which I have seen surpass Frances Lake in natural beauty, and the scenery on the east arm bounded on the east by rugged masses of the Tooisho range are very varied in form and a number of points surpass 7000 feet in height, while one was found to attain an elevation of about 9000 feet."

Allied to attractions of scenery are those of wild game which sportsmen delight to seek in their native haunts.

Bay Company from these regions as including the following:

Otter .....	14,430
Bear .....	15,942
Beaver.....	104,279
Fox skins (all kinds).....	137,388
Mink .....	376,223
Skunk.....	632,794
Muskkrat.....	2,485,368

Adding all other merchantable pelts exported shows a total of 3,983,672. Certainly no one will dispute the pre-eminence claimed for the game preserve with such returns.

SECOND, fisheries superior to any other on inland waters on the continent: These would be easily proven to exist if only the fisheries of Hudson Bay were con-

sidered, but there are scores of adjacent lakes which may aggregate still greater product. Great Slave Lake is an example, where in addition to white fish and trout, in the greatest abundance, its waters at certain seasons are fairly alive with Arctic Ocean salmon, which seek spawning ground there.

The following may be taken as a list of the more important fisheries of the Hudson Bay and tributary waters:

I., Right of bow-head whale. These enormous creatures are frequently found in the northern waters of Hudson Bay and adjacent channels. The value of bone obtained from a single whale is commonly about \$8000. The oil product which was formerly of about equal value with the bone, but now considerably depreciated, is also a desirable article of commerce. I have myself seen the skeleton of one of these monsters of the deep cast ashore on the coast of the bay from which the bone of commerce had been removed by its captors, presumably New England whalers, who only prosecute whale fishing in these waters.

II., Walrus, iii., seals (of at least six different species); iv., white whale; v., narwal; vi., sturgeon; vii., salmon (common seal); viii., Hearne's salmon; ix., cod; x. halibut; xi., Great Lake trout; xii., whitefish; xiii., herring, capling, etc. etc.

The leading question in regard to the fisheries will be where to market their product to the best advantage, and this should largely determine the selection of the first railway line to the bay which must rely on that industry for a large share of its traffic.

The aforesaid fisheries are now running almost entirely to waste.

THIRD, immense markets for the manufacturers of Central Canada.

It is a well-established fact that commerce will follow the lines of cheapest freight transit, other conditions being equal, time and distance being secondary to cost. Thus the salmon fisheries of British Columbia and the meat exports of Australia find their main market in England, although the distance in the first instance is 18,000 miles. Cheap ocean freights are the life of that trade.

The combined waterway system of the Mackenzie and Hudson Bay basins will enable a manufacturer in Toronto to deliver his products over the same to Athabasca Landing at a materially less rate than the same can be taken by an all-rail route, and this difference will be increased where more northern freight-points are concerned.

This means that we can command a large portion of the trade of all the vast territory north of the Saskatchewan Valley, and east of the Rocky Mountains under present conditions, if the said waterways and portage railways were opened for business.

The Mackenzie basin is one of the richest wheat districts on the continent, the section between and including Athabasca, Peace and the Liard Valleys, being a major part of it.

It may surprise you to know that the Upper Peace River Valley has a climate milder than that of Manitoba and comparing favorably with that of Ontario.

Mexican cactus grows wild on the Eastern Rocky Mountain slopes. Wild flowers bloom before they do about Toronto. This phenomenon has attracted the attention of scientific men, and perhaps the best explanation has been made by Prof. Macoun before the Senate Committee, in which he ascribed it to the "Chinook winds" which are heated on the arid plains of New Mexico and then pass along the eastern slope of the Rocky Mountains, not dissipating their heat entirely until they reach the Arctic circle near the delta of the Mackenzie River. From this cause the isothermal lines marking the limit of cereal cultivation are as near to the Arctic Ocean in the Mackenzie River Valley as to the Gulf of St. Lawrence. This renders the Peace and Liard Valleys better suited for wheat raising than Manitoba, so far as climate is concerned. Another fact is that the heads of wheat on each stalk are larger the higher the latitude in which they grow.

Professor Macoun being under examination before the Senate Committee, the question was asked him:

"You have stated in regard to plant life that northward up to the limit of its possible cultivation, it produced more seed than further south?"

Answer: "Yes, and I can prove it in two minutes. I have now in my hand heads of wheat and barley grown at Dunvegan in latitude 58, brought here by Dr. Dawson in 1879. Any one examining these heads will see that the fascicles contain from 4 to 5 grains—an average of 4 1-2 grains to the fascicle. Had I heads of wheat grown at Ottawa I would show you that the fascicles contain 2 and 3 grains. When I was on the Peace River in 1875, I got wheat at Lake Athabasca that contained five or six grains to the fascicle. If the farmers of Ontario, with their 2 and 3

grains to the fascicle, can produce 25 bushels to the acre, under the same conditions the men of Manitoba will produce 35 to 40 bushels to the acre and those of Peace River will run up to above 40, and those further to the north still more, granted that the same acreage produce the same number of stalks.

"When I passed down the Athabasca to the Mission I found growing on soil that would be of no value here whatever—sand, muck and cold swamp—wheat which they had planted on the 5th of May. I found it in stock on the 26th of August, and brought away grain that took the prize at the Centennial. A quantity of it was shelled and found to weigh 68 pounds to the bushel (standard weight 60 pounds)."

Professor Dawson, being also examined by the committee, testified that the greater length of the summer days (18 hours of sunlight) largely explained the exuberance of vegetation in the Mackenzie basin.

These are significant facts and the report of the committee is that in the Mackenzie basin, which includes the Athabasca, Peace and Liard River Valleys, there are 316,000 square miles suitable for wheat. This equals 202,240,000 acres, or nearly twice the total area of Ontario, large as we consider our province to be.

If but one-tenth of this was under cultivation and producing 40 bushels to the acre, the weight would equal 24,268,800 tons, and the value at 40c per bushel exceeds 323 millions of dollars for one year's crop.

We may reduce these figures by as large a percentage as we may deem reasonable but when we have done that, does not the remainder give us cause to blush that we are making so little effort to benefit ourselves and our fair land through the possession of such vast resources? Let us hope that our fate may not be like that of the unfaithful steward, who hid his unused talent in the earth.

There is another element of commercial importance which is well worthy of mention. (Quoting from Senate Commission report): "Indications of petroleum exist over a large area so extensive as to justify the belief that eventually it will supply the larger part of this continent and be shipped from Churchill or some more northern Hudson Bay port to England."

Also the extent and quality of the coal measures, which are not as yet well defined by exploration, are likely to be

such as to form great sources of wealth.

Extensive deposits of iron ore exist on the east side of Hudson Bay, and coal is said to crop out at various points along the coast. Other minerals, including silver and lead, are to be found along the East Main shore, but whether in paying quantities is yet to be determined.

Your attention is especially called to the fact that in the territory adjoining Hudson Bay in the vicinity of Chesterfield Inlet are areas the geological formations of which resemble closely those of other rich gold mining regions, and it is not improbable that we may find mineral wealth exists on the shores of our vast Canadian seas.

FOURTH, these waterways can be utilized as the most central "all-Canadian route" to the gold fields of Northwestern Canada; to demonstrate which I need only refer you to the enlarged map, on which the gold district is shown as extending from the junction of the Porcupine and Yukon as far south in British Columbia as the map permits, but which leaves 550 miles of the province not displayed, on the extreme south of which the group of Rossland mines are situated.

The scale of the map—8 miles to the inch—is fixed by the Government sheets which form a part of it, and which extend from Lake Athabasca to the delta of the Mackenzie River, the remainder having been added by a private draughtsman.

The gold district limits indicated upon it are copied from the official map published by the Dominion Senate Committee in 1888, and extend to the silver line you will see thereon. Beyond that is the territory since proven to be auriferous by subsequent explorations, including the famous Klondike district. The Senate Committee report the gold district in the Mackenzie basin to probably comprise 200,000 square miles. When to this we add the Yukon and Rocky Mountain districts, the whole area is not less than 700,000 square miles, or more than three times the area of Ontario.

Probably no other auriferous territory can compare with this either in size or in the richness of its placer or vein mining, at the most favored localities. That exploration has only commenced is quite evident, and that the attention of the world is turned toward it is well known to us all. You will see that the Liard River is situated about midway in the gold district of Canada, being about 750 miles from the northern



boundary, and 850 miles from the southerly one, measuring from the mouth of Nelson River. At the head waters of this river you will notice an area marked Cassiar district.

Gold was discovered in a small creek emptying into Dease Lake in 1872, by a Scotchman named McCullough and a Frenchman named Thibert, who went as partners to fish in the lake, in which as well as in the beds of some small streams washings are obtained as high as \$100 a day. At the mouth of one of these creeks from six to eight men took out 300 ounces of gold in one week, and the year's output of 1874 is stated at \$1,000,000. The population about the lake was estimated in 1876 at 2000, but the annual average yield thereafter decreased to such an extent that nearly all the miners left for other localities, and but a small number remain there now.

The total output of gold up to 1887 is reported by Dr. Dawson to have been \$4,886,000 in the Cassiar District alone.

Gold is also found in the Dease and Liard River bottoms, and it is stated that from \$6 to \$8 per day can yet be made by hand-washing along their sand-bars. Taking into account the length of small auxiliary creeks and rivers, it seems certain that there must be hundreds of miles of such water courses where many miners can find employment in the main valley of the Liard and its tributaries.

The reason why mining languished in 1876 was largely because of excessive cost of freight, the rate being 9 1-2 cents a pound, or \$195 a ton from Fort Wrangel. But lower down the river the situation was much worse where miners were more isolated than at the Klondike.

Dr. Dawson reported in 1887 that specimens of galena taken from the Dease Lake vicinity were assayed at Ottawa and found to yield "75 ounces of silver to the ton, and further that there is every reason to believe that before many years elapse British Columbia will take its place as one of the great silver-producing regions of the world."

In verification of this prediction the returns of the Mining Bureau of that province give the value of the silver output for 1897 at \$3,272,000, being \$626,000 in excess of the gold product of the same year.

I also have to note statements made by J. W. J. F. Betts, Speaker of the Northwest Territories Assembly as published in the Toronto papers during the past week that large quantities of gold

have been recently discovered on Hay River, not far from Great Slave Lake, which I have located on this map.

He stated that 27 prospectors were now camping there and the truth of such discoveries was amply verified. He advocated the Liard River route via Pelly branch as the best to reach the Yukon, and quotes the opinion of an old Hudson Bay Company employe Mr. Thomas Scott, who says: "In my judgment, by far the easier and quicker is to ascend the Liard River from Fort Simpson, the head fort of the district, to the head waters of the Liard, thence a portage to Pelly River, whence you can descend with good water to any place on the Yukon you may desire. The advantages of this route are: From the moment you strike the Liard River you are in a gold-bearing country, and continue in the same through the whole time of ascending this river. I am convinced that as rich diggings will be found on the Liard and its tributaries as have been discovered on the Yukon."

The announcement by Mr. Betts of the Hay River discoveries brings the "placer mining" about 1000 miles nearer than the Klondike to Ontario, with but one "divide portage" from its shores. Aside from that the two connected waterways from Moose to Hay Rivers could be easily traversed in less than a week. I shall, however, leave it to others to estimate the advantages to accrue to Central Canada by the opening of direct communication to this golden west, and the cost and time of transit in comparison with other routes, but submit it as a self-evident proposition that the interests of Canada require that a survey of the divide between these two great basins be made as soon as practicable.

Also, that the establishing of a mill service on this route in advance of ultimate railway transit across the divides would be of immense advantage to the Dominion in encouraging the advent of pioneer exploration and settlement in those hitherto isolated regions.

In conclusion, when we consider the limitless resources of our great northern territory and the magnificent facilities which nature's great architect has entrusted to us for their development, surely it becomes every loyal Canadian citizen, as well as every true statesman, to use his influence for their utilization and improvement as speedily as possible. Certainly one of the greatest glories of Canada is her God-given waterways.

J. W. TYRRELL, C.E.

March 29, 1898.



PHOTO TAKEN OF J. W. TYRRELL IN ESKIMO COSTUME.

Copied by permission from "Sub-Arctic of Canada" by J. W. Tyrrell, a most interesting volume of 280 pages published by William Briggs, Wesley Buildings, Toronto, 1898. Price \$1.50.

At the conclusion of his address Mr. Arthur Harvey, one of the leading members of the Institute, moved a vote of thanks, and complimented the speaker upon being able to compress so much solid information into the limits of an hour's address. He made the enquiry whether the reindeer which he saw in such vast numbers on the barren lands were of the same species as those used for domestic purposes in Finland. To this the lecturer replied in the affirmative.

Mr. Bain, City Librarian, seconded the motion, which was carried with applause.

The president announced that remarks upon the subject were in order.

Mr. Robert Jaffray said that he heartily endorsed the suggestions made in the address that steps should be at once taken to open up a prospector's route over the divide between the great basins, upon the lines indicated by Mr. Tyrrell, and he thought, if an organized effort were made to promote the same, that both the Provincial and Dominion Governments would co-operate in time to utilize the present season in measures to that end. He noticed that the lecturer referred to the "Harvey Route" as probably the best one to reach the Mackenzie basin from this direction, in which opinion he concurred, and would say that he thought the people of Ontario were greatly indebted to that distinguished engineer for pointing out the advantages of that idea, of which he was undoubtedly the originator and he hoped would become the successful promotor. We want, said Mr. Jaffray, such abilities interested in the development of our boundless resources, and should encourage them.

Ex-Alderman Scott considered the address of Mr. Tyrrell as containing the most important commercial suggestions ever presented in that form in this community. He could, as a business man, endorse the proposition as stated, that commerce would follow the line of cheapest freights to the best markets. By the application of this rule he believed that it could be shown that Ontario could supply the major part of the great gold producing area of Canada with manufactures of all kinds cheaper than from the Pacific coast, and that the business would commence as soon as a fairly passable trail was opened across the divides on the Harvey route, and a steamer service commenced on the several waterways. He was himself president of a steamship line established to afford communication between the points on the southern coasts of Ontario, from Georgian Bay to Fort William, in connection with the railways from Toronto

to the Bay, and as soon as a trail was opened from Mississauga to the navigable waters of the Moose River, the steamers of his line would make regular connection at Heron Bay with that route, which might be available for Toronto traffic the present season if proper steps were promptly taken. He said that although not of the same political faith as the Provincial Premier, he felt that the thanks of all citizens of Ontario were due to Mr. Hardy for having taken the first practical step in this direction, by the appointment of Mr. Charlton as a Special Commissioner to investigate the subject of the most practicable route, and the report of the latter was a very valuable contribution of information on that important question, which he would advise all our business men to obtain and study with special interest.

Rev. Dr. Parsons said that he had just returned from a trip down the great Mississippi Valley to New Orleans, and he was greatly impressed by what he saw of the enormous amount of commerce moved along that river on steam barge lines. Canada, having the next largest river on the continent, for such a long distance within her borders, should study the object lesson thus afforded, with a view of its early application upon the new routes so ably considered in Mr. Tyrrell's address.

Mr. George H. Kilmer spoke in favor of having the lecture repeated in a larger hall and with more notice to business men of the city, to secure their attendance. The prevailing ignorance of the resources of Ontario as connected with its northern section and seacoast was appalling, and should be removed as fast as possible. He was able to state that he knew of English capitalists who were looking favorably upon the capabilities of the new system of interior waterway communication in Canada, advocated by Mr. Tyrrell, and that with proper encouragement from Government he believed the necessary capital to develop the same could be obtained. He would suggest that, after the adjournment of the meeting held under Institute auspices, a committee be authorized by those present who favored an organization for further action to take necessary steps to that end.

After remarks by Mr. O. A. Howland, a number of business men met and constituted a committee to promote the utilization of the main waterways connection in the great basins of Canada, Mr. Kilmer was named as chairman and Mr. Frank W. Maclean, secretary of the Toronto Provisional Committee, to which was referred the adoption of a name, and rules of procedure, to accomplish the objects aforesaid.

At a subsequent meeting of the Provisional Committee, the name of

**THE CENTRAL CANADA BUSINESS EXTENSION LEAGUE**

was adopted.

Also rules of procedure which included the formation of a General Committee of not exceeding fifteen members to be selected from residents of Central Canada, representing manufacturing, mercantile, agricultural and financial interests therein, and of local Committees at those business centres most directly interested in opening the proposed line of access to the great Canadian North West.

Temporary headquarters were provided at No. 10 King St. West.

All communications to be addressed to the Secretary, Room 22, No. 23 Adelaide Street, Toronto.

**FRANK W. MACLEAN,**

*Secretary, Provisional Committee.*

