(October 27, 1930)

Science and Western Resources

By Robert C. Wallace,

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President Henderson:—Gentlemen, at the annual conference of the Association of Canadian Clubs, held in London last June, I as your delegate had the privilege of being present. I had the pleasure of hearing Dr. Wallace speak from the floor of the convention and I made up my mind I would make every effort to get Dr. Wallace to speak to the Canadian Club of Toronto during my year of office. The convention realized the importance of having a strong able man to carry on the good work our own friend Mr. MacDonald had done previously and they were successful in getting Dr. Wallace to accept the presidency of the Canadian Clubs, and I am sure his good work in the association will be a great benefit to the whole membership throughout Canada this year. Dr. Wallace came to Canada from the Orkney Islands twenty years ago. In sixteen years at the University of Manitoba as lecturer on science and geology and in his next two years as the president of the University of Alberta he has not only given of his brains but also of his wonderful personality and in this way he has made a great contribution to this country of his adoption and to this generation of Canadians. Dr. Wallace, it is truly an honor that you have conferred on the Canadian Club today in being their guest. We welcome you. I know the members are anxious to hear you talk on your subject of science and western resources. I have much pleasure in introducing Dr. Wallace.

Dr. Wallace:—Mr. Chairman and gentlemen, when I had the honor of being invited by your president to speak at your club on my visit east I felt that probably the most

useful subject from my standpoint at least, and I trust from the standpoint of the members, would be in the field in which I am personally interested and have spent many years. And I think it might also always be useful when a westerner comes east to speak about things western. He cannot speak about things eastern and there may be some value in discussing with eastern men some of our western problems.

When John Talliser went east on his famous expedition in the late 50's last century there was little in the way of development of the western plains. His work and the work of Hector and the others was responsible for opening up of gates through the Rocky Mountains. Had he failed the way was closed for all time for any link up of eastern with western Canada across the rockies by way of Canadian soil. Confederation came and there went out to the west a little excursion, a little party about which I have had occasion to think a good deal in the last few days because I have had the privilege of attending numerous sermons at Queen's. A little western party of which the secretary was a young Halifax Presbyterian Minister. If you will read, as I hope you do, "Ocean to Ocean", by George Grant, you will realize at that time, in the early seventies, there was appreciation, at least on the part of men of vision like himself, of what the west was going to become, and the whole point of view of that excursion was the point of view which forecast in a remarkable way what has been true the fifty years or more since that time. So after all we are thinking of a west of about fifty years, and in fifty years in any country all that can be done is to deal in a preliminary way with the primary resources. It can hardly be expected that in that time much can be done with secondary industries which are developed on the basis of the raw materials won in the primary industries. What I mean is: it is very unlikely that more could be done in agriculture than simply to win from the soil the material the soil will grow and export it. It is very unlikely in the field of mining much could be done except to win the raw material from the earth and if used elsewhere new industrial processes will naturally follow the mining industry. And that

is really after all the stage we have reached in western Canada. We are still in the primary industries stage with forward looks to the secondary industries, more particularly, it is true, in Winnipeg, but also to some extent even in the western plains today. And what has happened is that during the last twenty years in particular science has been playing its part in facing problems which are so difficult and so large on the western plains, and attempting to find solutions.

One of the great troubles we have, and I am not going to speak about it because I have no panacea, is that the peaks are much too accentuated in our western development, as General Mitchell would say. The times of very successful development, with all it means in a people's psychology, and the times of depression are too far separated from each other in the curve. The function of any force that can be devoted to that end is to flatten out, as an engineer would say, those peaks so the west and the country at large can look forward to a continuous period of relatively level prosperity and development; of high peaks but no low. And I think it is the function in particular of men of science, whose vision is a long, forward vision—five, ten, twenty years from now—whose business it is to see the problems long before they become insistent, to try in every way they can in their assistance to industrial and natural resources development, to flatten out these peaks. And what I have to say is in connection really with some of the endeavors that are being begun and being made today by many large forces to see the problems, face them squarely, try to find solutions, and discuss those solutions with business and industrial men.

It has been the case in Canada that we have suffered from superlatives to an extraordinary degree, superlatives that lulled us to sleep, and the time has come when we are facing very definitely practical, serious problems and attempting to solve them and are willing to forget about the superlatives. We have not illimitable resources. The resources we have, we have to face the development of, in a very careful, business-like way, particularly because of the fact that our markets under present conditions are somewhat limited markets.

What is very hopeful is this, that as far as the west is concerned, and I am speaking only of the west, there is a very rapidly growing appreciation of the value of applied science and the attempts that applied science is making to help solve financial, economic, industrial difficulties of the people of western Canada, not only on the part of industrialists, because that was to be expected, but on the part of the men whose business it is to formulate policies of government, because, after, all the work of the scientists in the practical field, and the work of the governmental administrator in his practical field, run side by side.

Much work has to be done by the scientist; many fields have to be explored before it is possible for the man whose responsibility it is to found policies to establish those policies soundly. Might I point out as an example this one fact, that in the early days of settlement of southern Alberta people settled without knowledge of the value of the land for any particular purpose, whether for ranching or wheat growing, because the land had not been explored by the scientists. It is possible today in the newer pioneer areas which are opening up in Northern Alberta, Peace River and beyond for the scientist to make a soil survey and tell what the quality of the land is, in order that the prospective settler may know its possibilities. Had that been possible in the early days of Alberta, a great deal of trouble would unquestionably have been avoided. Science has come to the stage where it can co-operate in a satisfactory way with men in governments, who, fortunately, appreciate the value of that type of work.

One of our real difficulties in the west is that the whole viewpoint of the people is concentrated on the months of June, July, August and September. Our vision is the vision of the harvest of each succeeding year. It is a psychology which leads to relatively short vision, as if you were born by the sea and your eyes had been accustomed to long view, and you had lived your life inland and your vision of the eye becomes limited because of your surroundings. Now I think there is something of that in the fact that we are so utterly dependent in the west on harvests and what they are to mean. For that reason the long distance vision

of the northerner has not yet made itself felt on the western plains and may not do so indeed until a much larger variety of occupations and a much more diversified type of agriculture may be possible on those plains. And so we are relatively somewhat easily depressed, and naturally if the scientist in his view of things can assist in projecting the vision to the rainbow away back in the mountains, where, at the foot of the rainbow, lies the pot of gold, he will at that very stroke do something to help us out in some of our difficulties.

What I wanted to speak about was some practical ways in which science has been and is operating in the west. I should pay tribute to the organizations which were responsible for this work, first of all to the Research Council of Canada, which is a national body and which is concerned with industrial and economic progress through scientific research in any field whatever. The stimulus of the Research Council is very great and marked in Western Canada. May I say we in the west who have been interested for many years would like to pay tribute to the sound judgment and vision that the Dominion Government have had in various departments in administering and conserving those western resources? Then also in the western plains we have the various universities—they are state universities, supported by the people of the provinces, and the people in return have the right to ask these universities to utilize part of their resources and take part in the fundamental work of making easier pieneer life among the people, in order that they might find some leisure and some of the good things of life, in order that the more deep-seated and eternal things with which a university is concerned may have an opportunity to flourish. The western universities are concerned in many of their departments with the very practical work of applied science.

Then also the governments themselves, through other agencies such as research councils, are interested. We have a research council in Alberta for which money is voted for practical problems, Alberta problems, which are too local for the Research Council of Canada to spend very much of their time on. All these forces are at work in a co-operative

way. In Western Canada we have not yet reached the stage where the practical industrial problems of secondary industrial development on the primary have become pressing problems. With you in Ontario it is the industrialist primarily that can be assisted. He is a man at the secondary stage and his problems are the main problems and will be for such foundations as the new Research Council of Ontario.

With us that is not so. They are practically all primary problems. Let me take one illustration from the Research Council of Alberta; it deals with the winning of tar sands in the MacMurray district sufficiently inexpensively to make it possible to use that bitumen as road-building material throughout western Canada, and also as a base for the development of gasoline or the use of hydrogen when the time for that comes.

Then there are great areas of coals which have to be visited by the scientist, as he can grade them in such a way that a man buying in America may know exactly the quality and type of the coal which he is purchasing. There are many rather difficult problems connected with the coal industry today which we all appreciate. The difficulty of adjusting production to the markets, which is so wide spread, because the coal is so easily obtained, while the markets are variable and apparently somewhat limited in the world today.

Then besides there is a great problem which has been perplexing us very much in the last two years in the development of the possible oil areas in the west, particularly of Turner Valley. It so happens that when oil occurs there, it is with a large amount of gas. And with every new development comes so much more gas, which, with our present small population, cannot apparently be easily used. And today down in the Turner Valley some 300,000,000 cubic feet of gas goes up in the air, burned in smoke, equivalent to at least ten million tons of soft coal per day in actual fuel value. That is one of our present problems, one that unless we meet successfully the next generation will say we fell down absolutely in our responsibilities.

Another problem will be some means of introducing

secondary industries into western Canada, because it is possible from the researches now going on in Ottawa and in our own laboratory, to develop from that waste gas some products which are very valuable: benzole, glycole, and others which might be developed. We have the beginnings there of a chemical industry, and chemical industries have the happy faculty of drawing to themselves other industries which can use some of those by-products.

The fields in which research has been going forward in the west are primary agriculture, of course, which is and always will be the main industry with western Canada. Ever since the introduction of the Marquis wheat of Dr. Saunders in the west there has been found the need for a wheat which for certain areas may be cut earlier, still retain its milling qualities and resist disease, and there have been established stations at our universities, in Manitoba a rust research station, in Saskatchewan a similar type of station, in Alberta a red-rust station, which is one of our most important problems. Now at all those stations there are men of the most expert training in their own particular field of plant biology or plant genetics. Here is a field where the practical application of pure science requires extremely highly trained men in the development of varieties by breeding largely. It involves study of genetic relationships because many of those fungi are of the same variety. The rust for example has a numerous family and they have to be studied, and how they will be developed one from the other has to be studied in order to be sure that the type of resistant wheat is grown which will not be affected, seriously at least, by diseases. You will see that it takes a long time, since one has to wait for each new generation of wheat to come along each summer. But fortunately it is possible to hurry nature, and a great deal of work is being done by the stimulus of the ultra-violet lamp in growing more rapidly the types of generations that have to be experimented on.

Also in the other problem which has come before the agriculturist, that of the winter hardness of wheat, it has been possible for the low temperature laboratories to expose these new wheats to the same degree of freezing as

nature would expose them to, and do it in a few days. So it is not now necessary to wait for winter to do the experimental work for us. I envy some of these people on the biological side because my field of work was in geology, where a thousand years are as a day, or a moment, and it was very hard for us to do experimental work by hurrying nature to enable us to peer back into those distant days of the past.

I remember having to speak to a group of prisoners in Winnipeg who were asked by the warden to listen to lectures in order to get their minds away from the morbid. I happened to mention that the land had risen some four hundred feet since the ice disappeared fifteen or twenty thousand years ago. It may be rising yet; and I happened to mention that that was a very short space of time, and after I was through a young man got up and said he was very much interested (he was committed to jail for five years for forgery) and the only remark was he was very glad I had not been the judge before whom he appeared, if I thought fifteen or twenty thousand years a short space of time. After that I always look very carefully at my audience.

It will always be the case, I think, that the larger part of our work will be done in agricultural experimentation in the west but there are other fields, the field in which I personally have been more interested, the field of mining, and it is only necessary to see, as an illustration of what research work can do, that one of the most interesting developments in the west in recent years, that of the Flin Flon and Sheritt Gordon and Northern Alberta, is due to the work of the scientist. The flotation process after all is a simple one, by means of which some ores in fine powdered material will rise to the surface while others under certain conditions will not. It was only possible to develop these industries in northern Manitoba through experimentation work carried on at Ottawa and other places. That is an illustration of the fact that progress of that kind rests on careful scientific work. The work at Trail in British Columbia is an illustration, in another field of ore bodies. In the field of

development of mineral resources we have gone forward in amazing strides in the last fifty years.

About twenty years ago we felt it would take about a hundred years to map northern Canada by canoe. If it were necessary to do so it could be mapped now, well, I would hesitate to say how many years, but I should think probably in ten. I doubt whether that will be done, because it will not be necessary quite so quickly. The whole north has come so much nearer that we do not yet appreciate it. There come down to Edmonton every fall men talking about the Coppermine country as glibly as we used to talk about country fifty miles from the railway.

I bid fair to say that one of the most challenging problems before us today in any field of scientific technical research is the problem of developing transportation systems of a kind that will adequately meet the new demands of development of resources far away from the operation of railway lines, and I feel sure that the engineers and men of that kind are looking straight in the face of that particular very difficult problem, in order that we may go ahead with the exploration that is now possible with the aeroplane. If that can be done we face a new era in our outlook in Canada. But it has to be done in order to make possible development a far distance away from present transportation lines. It is only a technical problem for the engineer and he will in a short time overcome it.

There is another agency doing very great work, the Biological Board of Canada, with headquarters in Ottawa, with Dr. McMurrich of Toronto at the head. That Board is dealing with the habits of the fishes, most particularly of the west, in order that it may be possible to establish a fishing industry on a sound basis by knowing exactly what the habits of these fish are. Fortunately scientists are not ambitious. It is very necessary that they should have a vision and see ahead before the administrators have seen them, because it is necessary to get the foundation work established in sufficient time so that the work may reach a completion when the problem becomes most acute. And research work is going on in Western Canada while the problems are still young. They will become acute at the

time when at least it is hoped that the research work will bear fruit.

What is encouraging to those of us interested in this field is that never in all history has the man of affairs, not only the business man, because that is expected of him, but the man of affairs in the administration of a country, leaned so heavily on the scientist as he does today. He asks him for advice. He awaits the development of his policies, which must be long-distance policies if they are of value. The scientist gives all the advice he can, and those forces which are at work for us in the universities are going to mean much for the future of western Canada. This close relationship between the scientist and the administrator means also that the problem of necessary finances will be more readily and easily met as time goes on and as the value of the work is seen.

I have spoken of the material resources of western Canada. I would not like to leave you with the feeling that that is the only kind of resources which we are interested in. If there is any one thing more than another that may be needed today it is this, that the men who are concerned with the physical sciences and the men concerned with the social, home sciences and consequently with people primarily, ought to get together in their work. I have the good fortune to sit on a little board concerned with development problems in Canada, financed in part from the United States, which is concerned with the problem of pioneering in the newer areas, not only from the economics of the problem but also from the social side of the work. And there sit on a committee like that not only men interested in the country and its resources but men interested in the people, and I have brought home to me in a way not brought to me before very clearly this need, that we must face in the future a side of the problem concerned with people and the things people have to deal with in life. So I think you will find, just as in Yale some few years ago there was established an Institute of Home Relations which gets together the men interested in history, sociology, economics, psychology, and any other field of that kind dealing with people, to discuss the problems of people and

their environment, so we will see also here that that movement will widen so the men interested in the things people have to deal with come together in order that the instinct of the scientific men in any field may be turned to the better living conditions of the people.

We in the west are in a very practical age, an age of hard work. The universities work in a practical way at the present stage. In western Canada we are able to turn pure science into a practical field of endeavor. They crowd into our applied science courses. Boys of eight or ten know a motor car instinctively. It simply comes to them. It is part of their equipment in a way we older men did not know. We are in that stage and we make use of it quite frankly because it is a field of practical importance.

But there are the fields of better living which are just as important, and it is a great pleasure to see institutes like the National Council doing this work so as to understand the conditions which have led to strain and lessen this strain, research work not only theoretical but practical in order that the depression in the country which has led to heavy mental strain may possibly be eliminated by the scientist, in order that there may be growing up a people with an easier mentality than in the past, and in order that mental institutions may not be so full of inmates. In hard times such as these we find in our extension department that what the people ask for is not some information as to how better to grow corn, but they ask for a man who will interpret to them literature, who will interpret to them Canadian history and poetry. At the times when people are under strain they go back to the fundamentals, and more and more institutions such as ours and other institutions must realize that these are the things that will endure and continue for all time, and that the problems I have been discussing are problems pressing hard on us at the moment, but they will not be eternal problems, and that we in meeting these problems are laying the foundations for those things which are of all time, of all ages, and which the people always at this time, as well as other times ask for as their right.