

to the Dominion of Canada. The trees are at their perfection at the centre of their distribution.

#### DISCUSSION.

Request of Dr. Saunders, Dr. Bell indicated map the line of northern distribution of silver-leaved maple (*Acer dasycarpum*), which is generally a little south of the Canadian Pacific Railway line north of Lake Huron. Dr. Saunders stated that he had found *dasycarpum* as far north as Portage la

Henry Joly: My investigations indicate that white spruce does not grow as fast as Mr. Bell's experience seems to suggest. I have thousands of white spruce logs in the neighborhood of Quebec and have never found a growth more favorable than one inch in five years, so that thirty years would only give six inches.

Henry Joly exhibited two specimens of spruce as an illustration of his remarks. There had been an increase of one inch in diameter in seven years.

Dr. Saunders: In the Maritime Provinces we find that the white spruce will reach from twelve inches of timber one foot from the trunk in ten years. We have many specimens at the Experimental Farm there, of which measurements have been taken from time to time, and the climate there is much more moist than in Quebec.

The rate of growth of white spruce is an important point, as it is required for pulp, and it is important to know in what time we can produce a pulpwood crop in Quebec.

William Little: The question in connection with spruce is an important one, as it is important for pulpwood. It must be borne in mind, however, that the timber grown in the field is the important matter, not a single tree in the garden. We have spruce trees of considerable growth in our garden, but they are all killed. It would be impossible to get a thirty-fourteen foot log out of them.

W. D. Perley: I can remember a field in Brunswick which was a pasture when I was living there, but it is now all grown over with spruce bush.

William Hingston: The fact should not be forgotten that the spruce has no definite rate of growth, that the growth depends upon conditions. I have been planting for years, sometimes five hundred spruce, and in a certain area can tell what trees will grow fast and what trees will grow slowly. Those that are well protected will grow the most. Some trees grow as much in three years as others in twelve years. I would like to ask Dr. Bell whether he thinks that low elevation has much to do with the growth of trees. Is it a question of high or low elevation than latitude? If a high level plain occurs is there an abrupt change? Also whether there is a change in the umbrageous character of the forest with elevation?

Dr. Bell: I consider that elevation has a great deal to do with the growth of trees. When there is a change in the elevation occurs there is a sudden cutting off of trees. As we go up the line of perpetual snow moves lower in passing from Lake Superior to Hudson Bay. We lose sight of certain trees in crossing the line of land, and after descending on the other side the same trees appear again.

Dr. Saunders: Does increase in elevation help the growth of certain trees.

Dr. Bell: Some grow better on high land, for instance the hard maple.

Dr. Saunders: The reason I asked that question is because I have found on the Riding Mountain, at an elevation of 1,800 to 1,900 feet, *Populus tremuloides* growing to a great height, while on the lower ground it was not nearly the same size.

Mr. W. T. Macoun: Has the white pine been found growing upon swamp land?

Dr. Bell: It grows on swamp land in some places in Western Ontario.

Dr. Saunders: How far north does one go before the tamarack changes its character as to choice of ground? I have seen tamarack in wet ground as far north as the Swan river.

Dr. Bell: The change takes place about the height of land. The absence of trees in Manitoba must be due to some inherent difference in climate. The trees do not stop abruptly on reaching Manitoba, but begin to curve southward east of that line.

Dr. Saunders: Why is it that on the southern banks of the rivers in the west the trees are of considerable size, while on the northern bank they are smaller? Is not this due to fire?

Dr. Bell: I have noticed the east and west banks show the same difference, the east slopes having a better growth than the west. I think it is due to the fact that in the spring, being exposed to the sun on the south-facing bank, the sap is forced up early and the first severe frost bursts the bark and destroys the tree.

Dr. Saunders: We have had apple trees killed at the Experimental Farm before they were large enough to run sap.

Mr. Stewart: I was at the meeting of the Manitoba Horticultural Society lately, and Mr. Stephenson there showed specimens of wealthy and hibernal apples grown at his place in Manitoba. The apples were well-formed and matured.

Dr. Saunders: I know Mr. Stephenson's place well and the trees are growing at an elevation of less than 700 feet. There is heavy wood to the north and west, while the orchard is so surrounded by evergreens that it is difficult to find it.

#### HISTORY OF ECONOMIC FORESTRY IN ONTARIO.

Mr. Thomas Southworth, Chief of Forestry for the Province of Ontario, read a paper on the "History of Economic Forestry in Ontario," in which he outlined the steps which had been taken by the early government of Canada for the reservation of timber, and also the policy now being followed in regard to the setting aside of timber reserves such as that at Lake Temagami, the forests on which would be dealt with in as scientific a manner as possible. At one time, Mr. Southworth stated, the forest was considered by the settlers to be an enemy to be removed. As a result, in some of the older counties of Ontario, the present wooded area was less than 5 per cent. of the whole. The land burned over is still unsettled and unsuited for tillage, and should be placed in forest reserves. Fire ranging, Mr. Southworth said, served both to protect and establish the timber areas. He considered it was fortunate that the crown kept control of the timber instead of disposing of it to lumbermen, as had been done in the United States.

During the French occupation the home government made no provision to protect any but the oak timber, but happily this condition of affairs had been improved on. Amongst the measures adopted for the protection and reproduction of the forests were the remission of taxes on forest lands and the establishment of Government nurseries similar to those supported in New Zealand. The high lands, he maintained, should be kept well timbered, as the rivers have their sources there. The fact was mentioned that farmers are now planting trees as wind-breaks to ensure better crops. Mr. Southworth referred to the fact that the fire rangers had saved many million feet of timber, and Mr. J. R. Booth remarked that there was not one fire now where ten occurred years ago. This happy improvement was due to the efforts of the lumbermen themselves as well as the rangers.

Prof. John Macoun, F.L.S., F.R.S.C., Assistant Director and Botanist of the Geological Survey of Canada, then read the following paper:

#### THE DEFORESTATION AND REFORESTATION OF THE WESTERN PRAIRIES.

By PROF. JOHN MACOUN.

I wish to make some statements with which some of you gentlemen may not agree, but I know of what I am speaking and am prepared to support my views, and I hope those who may be of a contrary opinion will put forward their view of any questions that may be discussed.

There is a diversity of causes for prairie fires. The time was when a large part of Manitoba was covered with forest, and also immense tracts of Eastern Assiniboia. In fact, south of Indian Head less than forty years ago there was a considerable growth. In places where now there are no trees and where settlers say that trees will not grow, forty years ago they were covered with forests.

I want to corroborate a statement of Dr. Bell's. I saw two prairie fires in 1894 at Crane Lake caused by lightning. If prairie fires are caused by lightning, Dr. Bell is probably right in saying that forest fires to the north of the prairies are so caused. I have seen three or four thunderstorms succeed one another on the prairie, without any rain. I was on the prairie before the settlers. I had the privilege of exploring in the year 1879 for 2,500 measured miles on the prairie traveling in carts, and in 1880 between eighteen and nineteen hundred miles. At that time the prairie was covered with grass in places, and in other places there were many tracts of burnt forest, especially on the edge of what is the prairie now. Beyond Last Mountain, before you reach Long Lake, we came to the edge of the prairie and we got no more wood for two weeks. But I want to call your attention to one thing we noticed. South of where Humboldt is now, we saw a small white bush with a pond in front. And what did this mean? When the prairie fire went round the pond it would leave a small triangular piece unburned.

Twenty years ago I went to Captain Devile and said, "The Touchwood Hills have no existence. What did I mean? They were wooded, while the rest of the country was bare, so that they had an appearance of height which really did not exist. And why was this so? Because in front of the hills a continuous series of ponds of water was found. When the fires came to the ponds they ceased to exist. The whole country was wooded and we called it 'hills.'"

At Moose Mountain I found a whole series of ponds on the north side of the mountain that it was impossible to fire. The mountain was a tract of land covered by wood. In late years these ponds have dried up and the fires have gone in.

In the country south of Battleford and the fires came from the south or south-west. I found that, as the fire came up on the ridges, the south or west slope was burnt off, but the north face was heavily wooded. If cold was the cause why should this be the case? The real explanation is that the fires burnt to where it was moist and then stopped. Next year it pushed farther and farther on until from latitude 51 to latitude 54 the land is burnt out. It is burned in the same way north of the Saskatchewan, and so with the woods in the Peace River Valley, which I examined in 1872 and 1875.