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The climate of Canada

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value, or at least to underestimate it. But I believe that—like the upper valley of the Nile, which is now rightly regarded as a most important region, and which a few years ago was not considered worth securing—these parts may come to be regarded as of great political importance, with reference not only to Aden, but also to the Egyptian Red Sea littoral and the northern part of British East Africa. I feel confident that water may be found, as in the Sahara, by artesian wells, in all the Tugs of the maritime and inland plains, and that the date-palm and other cultivation could be rendered possible, whilst the soil inland is undoubtedly richer. Much could be done to foster a trade which already yields a surplus to the revenues of Zeila. Somaliland is capable of producing and exporting vast quantities of sheep and camels; the latter would be most useful in supplying the present scarcity of transport in India. In the absence of a railway, the route from Lake Rudolph to Berbera is the best transport route from the inland regions of northern British East Africa, the whole distance being practicable for camels and free from fly.

Yet in view of the policy being pursued at this moment there is little ground for any hope that anything will be done to promote our interests, or those of the natives. If the Indian Exchequer, under the stress of present calls upon it, is unable to bear the burden of the responsibilities that pertain to the administration of Somaliland, the Protectorate might be transferred to the Colonial Office, whilst retaining the services of those trained officers that only India can provide, and who have performed their difficult task hitherto with magnificent success. That we should give up a portion of our territory to purchase some more important advantage elsewhere is a comprehensible policy, but in any case any one familiar with Somaliland, its people and its possibilities, can only deplore the prospect of the imminent ruin of British trade and influence, and of the brave race who have been taught to look to us for protection and will look to us in vain.

THE CLIMATE OF CANADA.

By Professor R. F. STUPART,

Director of the Meteorological Service, Toronto.

(*Read at the Meeting of the British Association, Toronto, 1897.*)

IN the Dominion of Canada, a country embracing one-half of the continent of North America, we naturally find a very diversified climate: on the Pacific coast, with the ocean on the one side and lofty mountain ranges on the other, it is moist and temperate; while on the east side of the Rocky mountains, on the high, level plateaus of the North-West Territories, and in Manitoba, is found a climate with large extremes of

temperature, but withal a bright, dry, bracing, and healthy atmosphere. In the valleys of the St. Lawrence and Ottawa rivers, a cold, but bright, bracing winter is followed by a long, warm, and delightful summer, while the maritime provinces, lying between the same parallels of latitude as France, and with shores laved by the waters of the Atlantic, rejoice in a climate the praises of which have been sung by successive generations of their people from the old Acadians to the present day.

The climate of Vancouver Island, as of all other parts of British Columbia, varies much with the orographic features of the country. The annual rainfall along the exposed western coast of the island and thence northward to Alaska is very great, exceeding 100 inches. At Carmanah, just at the entrance to the Straits of Juan de Fuca, the average of five years is 112 inches. At Port Simpson an average of ten years shows 108 inches. At Quatsino, half-way up the coast, in 1896 there were 108 inches, and at Rivers Inlet, on the mainland north of Vancouver Island, 104 inches. In the south-eastern part of the island between Victoria and Nanaimo, a district sheltered by the island mountains, the climate does not greatly differ from that found in the north of England. Not only does the annual mean average temperature agree very closely with that of parts of England, but the mean average of corresponding months is nearly the same. The rainfall is, however, more seasonable in its character. May to September is usually a comparatively dry period, while copious rains fall between October and March.

Crossing the Straits of Georgia to the mainland, we find a fine warm summer, and a winter increasing in severity as we ascend the Fraser valley and get to higher levels. At Agassiz, on the Lower Fraser, about seventy miles from Vancouver, is situated one of the Dominion experimental farms; the average mean temperature of January at this place is 33° , and of July 64° , with a daily range of 10° in the former month and of 26° in the latter; the lowest temperature on record is -13° , and the highest 97° . Frosts seldom occur in May, and there is no record of any during the summer months. The annual rainfall is 63 inches, 64 per cent. of which falls between October 1st and March 31st. This shows very approximately the climate of the Lower Fraser valley.

To the eastward of the coast ranges the climate changes. The prevalent westerly winds from the Pacific are deprived of much of their moisture on the western side of these ranges, and then eastward to the Selkirks, in Kootenay and Yale districts, the rainfall and snowfall are nowhere great, and at some places are very scant. The annual range of temperature is large, as is also the daily range during the summer months. Extremely low temperatures are occasionally recorded in the winter, and decidedly high temperatures are not infrequent in summer. The Chinook or *Foehn* effect is very marked in these regions, and temperature changes are at times very rapid.

The accompanying table shows the temperature found at four stations in British Columbia.

TABLE I.—The average mean highest, mean lowest, and mean temperature; the highest and lowest temperature and mean daily range; also per cent. of cloud and precipitation.

	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.
VICTORIA.													
Mean highest, . . .	41·7	43·8	50·1	54·7	61·6	65·3	69·6	69·0	63·3	56·0	48·1	45·7	55·7
Mean lowest, . . .	32·7	33·6	36·6	39·3	44·1	47·6	49·5	49·5	42·9	38·2	36·8	36·8	41·4
Mean temperature, . .	37·2	38·7	43·3	47·0	52·8	56·5	59·6	59·3	54·6	49·5	43·2	41·3	48·6
Mean daily range, . .	9·0	10·2	13·5	15·4	17·5	17·7	20·1	19·5	17·4	13·1	9·9	8·9	14·4
Absolute highest, . .	56	60	68	74	82	86	89	86	80	70	60	59	89
Absolute lowest, . .	-1	6	20	24	30	36	37	37	31	22	18	8	-1
Per cent. of cloud, . .	77	79	67	70	59	56	43	36	59	67	77	79	64
Precipitation, . . .	5·13	3·53	2·57	2·11	1·21	1·16	0·46	0·59	1·98	3·11	6·13	7·53	35·51
AGASSIZ.													
Mean highest, . . .	37·9	43·5	52·0	55·2	62·9	69·5	76·7	79·0	67·4	61·3	44·4	40·8	57·5
Mean lowest, . . .	28·2	31·7	35·9	38·3	44·8	48·3	51·0	50·5	46·7	42·1	34·1	31·9	40·3
Mean temperature, . .	33·0	37·6	44·0	46·7	53·9	58·9	63·9	64·7	57·0	51·7	39·3	36·3	48·9
Mean daily range, . .	9·7	11·8	16·1	16·9	18·1	21·2	25·7	28·5	20·7	19·2	10·3	8·9	17·3
Absolute highest, . .	57	64	74	82	90	95	95	97	90	82	73	58	97
Absolute lowest, . .	-13	-12	16	28	30	36	38	33	32	20	9	8	-13
Per cent. of cloud, . .	62	62	56	60	55	52	35	30	43	55	67	67	54
Precipitation, . . .	7·29	6·68	5·47	5·49	4·85	3·97	1·55	1·62	5·25	6·56	8·69	9·43	66·85
KAMLOOPS.													
Mean highest, . . .	29·6	33·0	40·1	50·8	68·2	77·3	82·9	83·0	69·6	56·8	39·5	34·6	56·9
Mean lowest, . . .	15·0	15·6	27·1	36·7	45·3	49·9	54·6	53·6	44·6	38·6	27·2	23·3	36·0
Mean temperature, . .	22·3	24·3	38·1	48·2	56·8	63·6	68·8	68·3	57·1	47·7	33·3	29·0	46·5
Mean daily range, . .	14·6	17·4	22·0	23·1	22·9	27·4	28·3	29·4	25·0	18·2	12·3	11·3	21·0
Absolute highest, . .	56	64	69	75	86	101	101	97	87	82	65	56	101
Absolute lowest, . .	-27	-27	-5	24	26	39	44	39	31	16	-22	-17	-27
Per cent. of cloud, . .	72	67	50	62	70	55	47	33	52	52	73	79	59
Precipitation, . . .	0·75	1·26	0·63	0·50	1·45	1·49	1·42	0·53	1·00	0·72	1·00	0·80	11·55
MISSION VALLEY.													
Mean highest, . . .	28·9	36·6	45·8	58·1	64·9	74·0	81·2	80·3	63·9	54·9	37·5	33·1	54·9
Mean lowest, . . .	14·7	19·8	23·9	31·9	39·6	42·9	46·8	44·8	37·5	30·4	23·3	21·6	31·4
Mean temperature, . .	21·8	28·2	34·8	45·0	52·2	58·4	64·0	62·5	50·7	42·7	30·4	27·3	43·2
Mean daily range, . .	14·2	16·8	21·9	26·2	25·3	31·1	34·4	35·5	26·4	24·5	12·2	11·5	23·3
Absolute highest, . .	46	55	65	79	86	94	98	95	82	74	56	47	98
Absolute lowest, . .	-10	-15	-6	14	25	29	32	31	20	16	-17	-12	-17
Precipitation, . . .	1·33	1·05	0·23	0·64	1·57	0·89	0·38	0·23	1·51	0·70	1·90	1·85	12·28

The climate of those portions of the Territories which lie near the mountains is one of peculiar interest, presenting as it does features which are unknown in countries nearer the sea and away from the mountains. Among the marked features are the rapid changes of temperature which frequently occur in short intervals of time; the great variations in different years, both of the mean temperature of the winter season and of the summer rainfall; also the fact that the summer season in the Great Mackenzie basin, just under the Arctic circle, is nearly as warm as in Alberta.

The phenomenon of the rapid changes in short intervals is accounted for and explained by the now well-known Chinook or *Föhn* effect, which is met with to a greater or lesser extent under the lee of mountains on the windward side of which moisture is precipitated. For long it was not understood why comparatively warm ocean winds should often, blowing across high cold mountain ranges, descend on the other

side at a higher temperature than when at sea-level. Some years ago Dr. Hann of Vienna was the first to explain the enigma as due to the retardation in the rate of cooling of the air during ascent, caused by the condensation of moisture, and subsequently the mechanical heating by compression in descent on the other side of the mountains. Speaking of the *Föhn* near the Alps, he says:—"Leaving out of consideration the cooling which goes on by the way, partly by radiation, partly by contact with mountain masses, a simple calculation will give the result that the temperature of a south wind will be about as many half degrees centigrade higher at the north foot of the Alps than at the south foot as the height of the mountain chain contains hectometres, for it is lowered half a degree for every 100 metres ascent, but raised one degree for every 100 metres descent." The normal conditions over the middle and higher latitudes in the winter are high pressure over the continents and low pressure over the oceans, which conditions are obviously not such as will produce the Chinook wind; but the normal conditions are at times broken by storm-centres moving to this continent from the Pacific, and it is when the movement of a storm-centre causes a south-west and westerly flow of air across the Rocky mountains from the Pacific that the Chinook blows over our western prairies. Sometimes a change of wind from north and north-east to south-westerly will, in Alberta, mean a rise of temperature from, perhaps, -30° to 40° in a few hours.

The variableness of seasons, while not entirely, is certainly to a very great extent, due to the varying position of the mean track of storm-centres in different years. The average mean track for January, deduced from many years, is across southern British Columbia; but in some winters the centres persistently move farther south than in others, and pass into the continent over Washington or Oregon States, and then the Chinook does not blow east of the mountains in the Canadian territories, but north-east and north winds prevail, accompanied by continued low temperature. In other years the storm-centres just as persistently move across northern British Columbia, and then the Chinook is the rule rather than the exception, and the weather under the lee of the mountains keeps mild. As examples of this variableness, the mean temperature of January, 1886, at Edmonton, was $-13^{\circ}4$, while in 1889 it was $21^{\circ}9$ —a range of $35^{\circ}3$. In February, 1887, it was $-10^{\circ}4$, and in 1889 $21^{\circ}9$, a range of $32^{\circ}3$; in November, 1896, it was zero, and in November, 1890, it was 38° . All other stations in Alberta show very similar variations, which are much greater than the difference between normal values for the warmest and coldest months at stations on the Pacific Coast. Example: Victoria normal temperature for January is 37° , and for July 60° —a range of only 23° . In the summer months, on the other hand, the range of temperature at these stations under the mountains between different seasons is as small as at stations on the coast.

Moving northward in the Mackenzie river basin we find that during the greater portion of the year the temperature diminishes as the latitude increases. January on the average at Fort Dunvegan is 14° colder than Edmonton, and at Fort Chipewyan is 22° colder; later, as the

spring advances, these differences become less, and by the end of May and during the following three months pretty uniform temperature prevails in Alberta, the Peace river, and northward almost to the Arctic Circle. In September the differences again become apparent, and reach a maximum in December or January.

Near the mountains signs of spring multiply as April advances, but in the eastern portion of Athabasca and thence to Hudson's Bay, together with all the northern portions of Keewatin, winter lingers until quite the end of the month. In April the 40° mean temperature isotherm passes through Alberta and Assiniboia, while an average daily maximum of 58° in southern Alberta gradually lowers northward and eastward until 50° is reached at Prince Albert and near the boundary of Manitoba; this indicates a spring slightly in advance of that of southwestern Ontario. Spring in this month also makes rapid strides in Manitoba, where the average mean temperature is from 35° to 37° , and the daily maximum about 11° higher.

The mean temperature for July at Winnipeg is 66° , and at Prince Albert 62° . The former temperature is higher than in any part of England, and the latter is very similar to that found in many parts of the southern counties; the diurnal range, however, is different from any found in England, the average daily maximum temperature at Winnipeg being $78^{\circ}1$ with a minimum of $53^{\circ}4$, and at Prince Albert a maximum of 76° with a minimum of 48° , and owing to these high day temperatures, with much sunshine, the crops come to maturity quickly.

In considering the climates of the Canadian prairies, the fact should not be lost sight of that, although the total annual precipitation only averages 13.35 inches for the Territories and 17.43 inches for Manitoba, the amounts falling between April 1st and October 1st are respectively 9.39 inches and 12.87 inches, or 70.3 and 73.9 per cent. of the whole. The average in Manitoba, 12.87 inches, is not far short of the average for Ontario during the same six months. As in Ontario, much of the rain in summer falls during thunderstorms, which, however, are of but moderate energy, and it is but very rarely, if ever, that the country is visited by tornadoes, such as are common on the more southern prairies.

The Province of Ontario can boast of as many distinctly different climates as can any country in the world. That part of the Province which lies immediately north and north-east of Lake Superior, and which forms the northern watershed of that great lake, has a long cold winter, and at times extremely low temperatures are recorded; indeed, scarcely a winter passes without 50° below zero being registered at White river, a station on the Canadian Pacific Railway. As a rule the snow does not disappear from the woods until the beginning of May, after which time, however, the summer advances very rapidly, and four months of superb weather follow. Travelling east and south-east the climate quickly improves, and in the valleys of the Ottawa and the upper St. Lawrence we find a moderately cold winter, but a singularly exhilarating, bracing atmosphere, which makes a zero temperature by

no means unpleasant. Signs of spring are not wanting; early in April and by the beginning of May foliage is well advanced, and then follows a decidedly warm summer. The whole of this region is, between the middle of May and middle of September, included between the same isotherms as the greater portion of France, and, after a protracted autumn, winter sets in again in November. The mean annual temperature of Montreal is $41^{\circ}8$, and of St. Petersburg $38^{\circ}7$. A comparison of the annual curves for the two places is interesting: the mean for January at Montreal is 5° lower than at St. Petersburg; in February it is but 1° lower, and then the Montreal curve steadily rises above the other until in August it is 6° higher; after this the two curves draw together and by December are coincident.

In the peninsula of Ontario, or that portion of the Province which lies east of Lake Huron and north of Lake Erie and the western portion of Lake Ontario, the winters are by no means severe, and the summers are seldom oppressively hot, this being due to the tempering influence of the lakes by which this part of Ontario is surrounded. In the western counties the April mean temperature corresponds nearly to that of southern Scotland, and in May the mean temperature of the whole district is slightly higher than for the south of England. The temperature conditions during the summer months may, as in the Ottawa and upper St. Lawrence valleys, be compared with those of France, the normal temperature for July ranging between 66° and 72° . September and October are generally delightful months, and seldom does snow remain on the ground until well on in December, except on the high lands of the interior counties. That portion of Ontario which lies immediately east of the Georgian Bay, the District of Muskoka at an elevation of 700 feet above the sea, abounding in small lakes, possesses a wonderfully bracing atmosphere, which, with a very high percentage of bright sunshine and a pleasant temperature, has made this region a summer resort much frequented by people from the cities and towns farther south.

The annual precipitation of the entire Province lies between 30 and 40 inches, which is fairly evenly distributed throughout the year; in summer, however, the rain generally falls in thunder-showers, and cloudy and wet days are of rare occurrence. The accompanying table shows the average climatic conditions at Toronto, based on a record of fifty-six years.

The summers in the south-western part of Quebec are as warm as in the greater part of Ontario; in July the 70° isotherm passes not far south of Montreal, the 65° line passes through Quebec city, and most of the Gaspé peninsula has a mean temperature somewhere below 60° . The winters throughout the Province are cold, and between December and March the ground has usually a deep covering of snow.

The importance of the covering of snow during the more severe winter weather cannot be overestimated, as it protects the roots of trees and herbage, and, besides this, enables those engaged in the lumbering trade in the northern parts of the Provinces to get the timber from the

TABLE II.—56 YEARS.

	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.
TORONTO.													
Mean temperature (56 years),	22.4	22.5	28.7	41.0	52.1	62.4	67.6	66.2	58.6	46.4	36.1	26.3	44.2
Absolute highest, . . .	57.5	53.8	70.3	89.8	93.4	93.4	98.0	99.2	93.6	80.7	67.0	61.0	99.2
Absolute lowest, . . .	-26.5	-25.4	-15.6	5.9	24.6	28.1	38.7	40.0	27.9	15.9	-5.0	-21.0	-26.5
Mean highest,	28.9	29.6	35.6	48.9	61.3	69.6	77.4	75.6	65.5	54.1	42.0	32.2	..
Mean lowest,	14.9	14.5	21.4	32.8	42.9	50.4	57.9	57.0	47.9	38.7	29.9	19.6	..
Monthly and annual ranges, . . .	51.3	51.8	49.3	48.2	46.5	46.3	42.4	42.2	46.8	44.1	44.3	40.8	103.0
Mean daily range,	14.0	15.1	14.2	16.1	18.4	19.2	19.5	18.6	17.6	15.4	12.1	12.6	16.1
Greatest daily range,	40.9	42.8	39.6	52.1	44.2	41.8	44.5	39.1	44.6	39.3	32.4	36.0	52.1
Average height of bar. at 32° Fah.,													
Highest barometer,	30.940	30.516	30.374	30.265	30.214	30.132	30.192	30.042	30.231	30.396	30.592	30.584	30.940
Lowest barometer,	28.166	28.535	28.594	28.704	28.644	28.909	29.101	29.099	28.863	28.731	29.452	28.459	28.166
Humidity of the air,													
Pressure of vapour,	0.108	0.109	0.130	0.186	0.230	0.418	0.488	0.483	0.393	0.258	0.178	0.123	0.263
Temperature of dew point, . . .	20.0	20.2	24.2	32.7	43.2	54.0	58.4	58.1	52.4	41.1	31.6	23.2	39.3
Amount of rain in inches,													
Number of days of rain,	1.16	0.88	1.44	2.18	3.05	2.88	2.99	2.87	3.27	2.36	2.67	1.60	27.35
	5	5	6	10	13	12	11	11	12	13	10	6	114
Amount of snow in inches,													
Number of days of snow,	17.4	17.0	12.3	2.4	0.1	..	..	..	..	0.7	4.6	13.8	68.3
	15	13	11	4	..	..	..	..	..	2	8	14	87
Number of days without rain or snow,													
Number of days completely clouded,	18	8	6	4	3	2	0	1	2	4	8	13	64
Number of thunder-storms, . . .	0	7	1	2	5	6	7	6	5	1	7	2	29
Number of fogs,	2	2	2	3	3	3	2	2	5	5	3	2	33
Percentage of bright sunshine,	29	34	43	49	48	56	60	58	56	42	28	22	44
Percentage of sky clouded, . . .	74	69	63	58	57	53	49	50	50	62	75	76	61
Number of hours during which the wind blew from													
N.,	91	76	87	84	90	88	89	94	87	82	75	100	1043
NE.,	72	70	87	81	77	66	49	92	93	89	73	92	941
E.,	58	61	97	129	104	125	62	94	104	86	79	65	1064
SE.,	34	22	30	34	60	62	62	74	44	44	41	25	532
S.,	34	24	45	51	90	99	118	98	77	85	60	27	808
SW.,	147	123	85	67	103	91	126	83	104	122	126	150	1339
W.,	175	163	137	109	96	82	93	86	96	121	169	172	1504
NW.,	151	123	169	162	117	102	139	119	111	112	93	102	1450
Calm,	2	5	7	3	4	5	6	4	4	3	4	2	49
Mean velocity, without regard to direction,	11.4	11.0	11.5	10.7	8.9	7.6	7.6	7.7	8.5	9.1	10.5	11.1	9.6

bush to the banks of the streams on which the huge logs are floated down to the mills, when in the early spring the rapid melting of snow and ice causes a flooding of all watercourses.

The opening of spring in the maritime provinces is usually a little later than in southern and western Ontario and the North-West Territories, and somewhat earlier than in the lower St. Lawrence valley; on the other hand, the summer is more lingering, especially in

the Annapolis valley. The summers are, as a rule, not quite as warm as in western Canada, great heat being seldom experienced, except very occasionally in the inland stations in New Brunswick.

The average annual precipitation of these Provinces is between forty and fifty inches, except along the southern coastline of Nova Scotia, where it is nearly ten inches greater.

The following table, based on the records of twenty-two years, indicate very closely the climate of the three Provinces:—

TABLE III.—The average mean highest, mean lowest, and mean temperature; the highest and lowest temperature and mean daily range; also per cent. of cloud and precipitation.

	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.
CHARLOTTETOWN.													
Mean highest, . . .	24.0	25.3	31.3	41.4	54.8	66.4	71.6	72.2	63.7	52.8	40.1	29.8	47.8
Mean lowest, . . .	6.2	7.0	16.0	27.4	37.7	49.0	56.2	57.1	49.7	40.2	28.3	15.9	32.6
Mean temperature, . .	15.1	16.1	23.7	34.4	46.3	57.7	63.9	64.7	56.7	46.5	34.2	22.9	40.2
Mean daily range, . .	17.8	18.3	15.3	14.0	17.1	17.4	15.4	15.1	14.0	12.6	11.8	13.9	13.9
Absolute highest, . . .	50.0	46.7	52.5	67.9	79.3	85.0	87.7	88.0	82.1	73.9	62.8	52.0	88.0
Absolute lowest, . . .	-26.7	-16.8	-14.2	2.4	25.8	35.6	42.0	43.5	34.1	26.2	0.3	-17.9	-26.7
Per cent. of cloud, . .	61	58	64	57	57	58	53	59	52	70	71	71	61
Precipitation, . . .	4.06	3.25	3.09	2.61	3.06	2.60	3.43	3.96	3.35	4.05	3.74	3.98	41.78
HALIFAX, N. S.													
Mean highest, . . .	30.9	31.6	36.5	46.6	58.4	68.2	73.9	74.3	67.6	56.2	44.2	34.3	51.9
Mean lowest, . . .	13.1	13.9	20.8	29.9	38.9	47.0	54.4	55.4	48.8	39.8	32.2	19.7	34.5
Mean temperature, . .	22.0	22.7	28.7	38.2	48.7	57.6	64.2	64.8	58.2	48.0	38.2	27.0	43.2
Mean daily range, . .	17.8	17.7	15.7	16.7	19.5	21.2	19.5	18.9	18.8	16.4	12.0	14.6	17.4
Absolute highest, . . .	54.9	50.0	54.5	76.2	88.0	92.8	93.0	93.1	85.0	79.6	64.5	54.8	93.1
Absolute lowest, . . .	-15.8	-16.9	-9.0	7.2	24.0	32.9	40.8	42.3	32.0	23.4	4.3	-11.2	-15.8
Per cent. of cloud, . .	62	58	68	59	63	64	57	61	52	63	65	66	61
Precipitation, . . .	5.63	4.94	5.15	4.00	4.43	3.68	3.43	3.96	3.53	5.21	5.26	5.52	54.74
FREDERICTON, N. B.													
Mean highest, . . .	23.3	26.3	35.2	43.9	63.2	72.2	75.9	73.6	65.5	52.3	41.7	27.3	50.5
Mean lowest, . . .	2.8	3.9	16.0	23.1	39.9	49.1	54.4	53.5	44.9	34.4	24.9	9.0	30.1
Mean temperature, . .	11.8	15.8	25.4	37.9	51.1	60.6	66.0	64.1	56.2	44.1	32.0	18.6	40.3
(6 observations each day), }													
Mean daily range, . .	20.5	22.4	19.2	20.8	23.3	23.1	21.5	20.1	20.6	17.9	16.8	18.3	20.4
Absolute highest, . . .	51.8	50.8	64.7	76.8	91.7	96.5	96.2	94.7	87.7	82.1	63.7	57.7	96.5
Absolute lowest, . . .	-34.5	-30.5	-27.2	-3.6	24.4	32.0	38.0	39.0	24.9	14.8	-15.7	-31.5	-34.5
Per cent. of cloud, . .	57	53	56	54	58	56	52	55	56	60	62	52	56
Precipitation, . . .	2.43	3.76	4.12	2.59	4.23	3.64	3.79	4.18	3.21	3.93	4.21	3.62	43.71

A very casual inspection of Table IV., showing the normal percentage of bright sunshine in various parts of the Dominion, as registered by Campbell-Stokes recorders, will render it very obvious that Canada is a country of clear skies. There are few, if any, places in England that have a larger normal annual percentage than 36, and there are many as low as 25, whereas in Canada most stations exceed 40, and some few have as high a percentage as 46. In England at but few places does the normal of any summer month exceed 45 per cent. At German stations the August maximum averages under 50 per cent. and in a few cases reaches 52. In the south much higher values are obtained: Vienna 54, Zurich 57, Trieste 66, Lugano 67, Rome 75, Madrid 84. These figures

show that it is only the southern parts of Europe that have more sunshine in the summer months than Canada.

TABLE IV.—Percentage of bright sunshine at fourteen stations in the Dominion (100 being constant sunshine).

	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.
Esquimalt, B. C., . .	20	22	35	32	40	43	53	56	36	37	20	16	34
Agassiz, B. C., . . .	21	21	24	21	29	35	46	48	27	30	18	14	28
Battleford, N. W. T.,	29	45	46	47	35	38	59	52	31	49	26	31	42
Winnipeg, Man., . . .	43	48	51	47	53	54	58	59	34	37	35	37	46
Brandon, "	41	45	47	40	44	46	58	61	47	36	29	32	44
Lindsay, Ont., . . .	26	34	44	50	47	56	57	53	53	39	24	21	42
Toronto, "	29	34	43	49	48	56	60	58	56	42	28	22	44
Stratford, "	25	24	36	40	44	54	59	55	45	37	24	17	33
Windsor, "	24	27	39	45	47	55	60	54	48	42	30	20	41
St. Catherine's, Ont.,	17	23	30	40	46	54	56	57	51	33	21	16	37
Montreal,	33	41	47	52	51	54	59	59	54	40	29	30	46
Fredericton,	40	44	41	47	46	48	51	50	48	43	33	36	44
Sydney,	31	34	32	39	43	47	48	46	49	34	27	19	37

The Great Lakes never freeze over, but usually most of the harbours are closed by ice by about the middle of December, and remain frozen over until the end of March or beginning of April. The average date of the closing of navigation on the St. Lawrence river is December, and of the opening April 21st. Harbours on the Gulf of St. Lawrence are likewise closed by ice during the winter months, but on the Bay of Fundy and the coast of Nova Scotia the sea is open all the year round.

THE PARLOUS PLIGHT OF GEOGRAPHY IN SCOTTISH EDUCATION.

By A. J. HERBERTSON, F.R.S.E., F.R.S.G.S.

At the Toronto meeting of the British Association a report on the position of geography in the educational system of the United Kingdom was read, from which we learn much about the neglect of that subject in Scotland.

"In the report questions of methods of teaching geography, the importance of good maps and appliances, the need of open-air and museum teaching as well as of frequent excursions, are not discussed, although in the improvement of our methods lies much of the hope for the future." The inquiry is confined to the position geography takes in our educational system as revealed by various regulations and programmes, which are compared with those of some other countries. Selections from these documents are printed as appendices and form the greater part of the report.