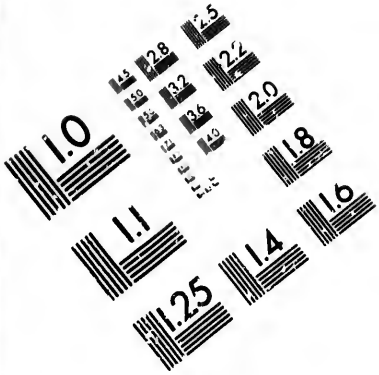

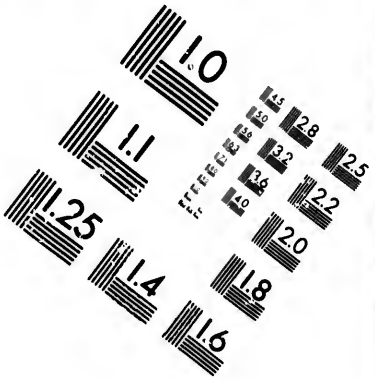

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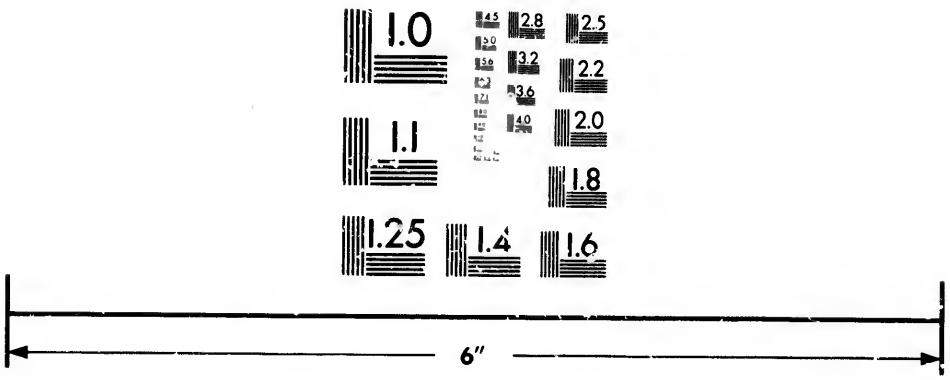

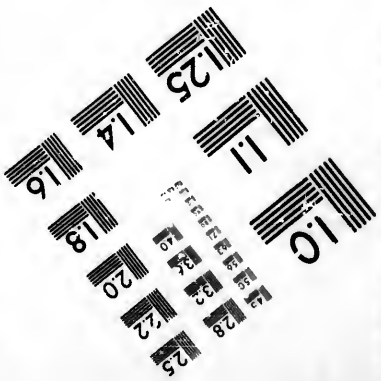

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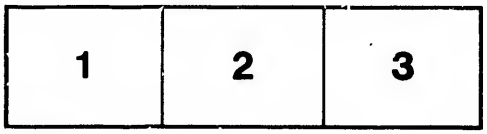

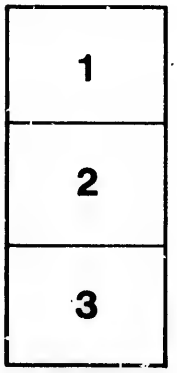

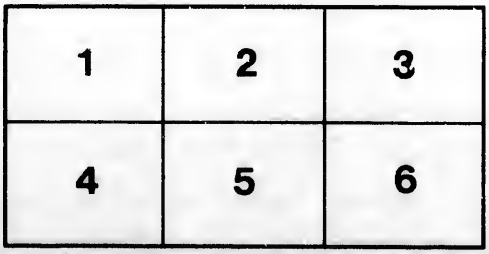

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THE

CLIMATES, PRODUCTIONS,

AND RESOURCES

OF

CANADA:

By J. BEAUFORT HURLBERT, M.A., LL.D.,

CORRESPONDING MEMBER OF THE R. H. S., LONDON, AUTHOR OF "BRITAIN AND HER COLONIES," "FORESTS OF CANADA," "FIELD AND FACTORY," ETC.

With Coloured Maps showing the Chief Zones of the Grains, Grasses, &c.

TENTH THOUSAND.

Montreal:

PRINTED BY JOHN LOVELL, ST. NICHOLAS STREET.

1872.

DR. HURLBERT'S BOOK.

The Climates, Productions, and Resources of Canada. By J. Beaufort Hurlbert, M.A., LL.D.

This work has, within a month, reached ten thousand copies. The Governments, Dominion and Local, are circulating large numbers of it.

The *Ottawa Citizen* says:—

We called attention to this work when the Department of Agriculture first ordered its publication, and we now give the opinions of gentlemen, the best qualified to judge of its merits. These gentlemen are themselves authors, and one of them has written a valuable work upon the "Red River and North West Territories." The maps are a new and important feature, and worth more than the price of the work, showing the vast areas in Canada of the best agricultural lands—more than 1,000,000 square miles of wheat land, and more than 2,000,000 square miles adapted to pastures, meadows, and the coarser grains. The work is divided into twenty chapters, and written in a clear, simple, forcible style. The scientific parts of the work are treated in a manner to bring them within the comprehension of the unscientific reader.

The following opinions are all from well-known Ottawa gentlemen:—

From Alpheus Todd, Librarian of Parliament and author of Parliamentary History.

Ottawa, 19th April, 1872.

My dear Dr. Hurlbert,—I have examined the proofs of your work on the "Climates and Productive Resources of the Dominion," and account it to be a most instructive and valuable publication. It is calculated to be of the first importance to intending immigrants and settlers, as indicating, at a glance, the agricultural capabilities of every part of Canada, and justifying the high expectations that are entertained of the inexhaustible fertility of our vast western country.

Believe me, dear Dr.
Sincerely yours,
ALPHEUS TODD,
Librarian of Parliament.

From Lieutenant-Colonel Dennis, Surveyor General of the Dominion Lands.

Dominion Lands Office,
Ottawa, May 16, 1872.

My Dear Sir,—As one of those who, having seen in manuscript your Pamphlet on the Climates and Resources of Canada, urged its speedy publication, I have only further to say that I consider it a very valuable work in a public point of view, condensing as it does, in a small space, a great amount of information respecting the most important interests of the Dominion. It makes its appearance at a most opportune time. The valuable and interesting knowledge

Continued on back cover.


ARCTIC
DAVIS STRAIT
HUDSON
BAY.
PACIFIC
ATLANTIC
UNITED STATES
MEXICO
CENTRAL
SOUTH AMERICA
MAP OF THE
GEOGRAPHICAL DISTRIBUTION
OF THE
GRAINS & GRASSES
IN
CANADA
AND THE
UNITED STATES.
Lovell & Co Lith Montreal.

THE

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PREFACE.

MANY and grave errors are entertained in reference to the climates and productions of Canada. For a more correct appreciation of the agricultural capabilities of this great country, we must compare the less known regions in the New World with the well known corresponding parts of the Old; western coasts with western, eastern with eastern, and interior divisions with interior. The several processes of reasoning here followed out, each independent of the others, lead to the same conclusions, namely, that there are vast areas in the New Dominion with climates and soils the best adapted for the great staples of the temperate zones. The maps are a new feature in the work, elucidating more clearly the subject, and shortening the explanations. From these it will be seen that the chief zones of the grains and grasses on the eastern continent, have their corresponding positions on the western; again, from the temperatures and rain-fall in the best regions of those staples in Europe, we can lay down on the maps the zones with similar conditions of climate in America, and these are chiefly in Canada; experiment has also corroborated the inferences drawn from the zones and climates as stated above, and proved that Canada, extending from the latitude of Rome in Italy to that of North Cape in Norway, embraces the better part of the temperate zone and the chief regions of the cereals, coarser grains, and grasses; and is the appropriate home of the ox, sheep and horse—animals most useful to man; it is, too, in the cooler latitudes where manufactures, commerce, wealth and power are found in the Old World. For these great staples of the temperate zones, Canada, as a whole, is as far superior to the United States as the Southern country is to the Northern for subtropical plants; yet even in the New Dominion the grape, maize, and the whole family of cucurbitaceæ, or gourds, mature over immense areas east and west, and over twelve degrees, or more than 800 miles of latitude; in the southern province the peach, quince and apricot readily ripen in the open air. Canada also embraces within her territories the climates most favourable for the apple, pear, plum, cherry, and the smaller fruits. In general terms, it may be stated that the Republic, in position on the globe, in climates and productions, is similar to China, Independent Tartary, Palestine, and Northern Africa; and Canada, to Central, Western, and North-Western Europe.

Some of the topics named in the contents, and not part of the main object of the treatise, are referred to in very few words.

MONTREAL, 1872.

CONTENTS.

EXPLANATION OF THE MAPS.

THE broad belts of green across the maps of North America represent the chief zones of the grains and grasses. They correspond in position on this Continent with the chief zones (drawn in green) of similar products in the Old World. This is also the region of summer rains in contrast with that of summer droughts to the south of it and west of the 98th meridian, represented by the light shade on the map of the western half of the United States and the south-west of Mexico. The area over which there is an insufficiency of rain in summer for the cultivable grasses and for the profitable growth of grain, extends far east of the 98th meridian, expecially in the latitude of Missouri, Kansas and Illinois. At the 97th Meridian this arid region extends from the Gulf of Mexico (Lower Texas) to British America, over 25 degrees of latitude. A line drawn from the middle of the southern part of Michigan, through the Mississippi at its confluence with the Ohio, to Texas, would roughly sketch the eastern border of the region deficient in summer rains. East of this are heavy forest lands, with more rains and less evaporation in the summer months. West of it the forests are at first broken, then found only along the rivers and on soils retentive of moisture, and finally disappear altogether, their place being taken by the cactus and sage of the desert, true emblems of a region devoid of summer rains.

The grains and grasses in the New as in the Old World, find their appropriate climates in the higher latitudes of the temperate zones, where the summers range from 57° to 70° Fahrenheit, and where the rain-fall is more uniform and copious. South of this belt the grains and grasses fail, either from too high temperatures or an insufficiency of rain accompanied with rapid evaporation and a dry atmosphere during the agricultural months, or from both these causes. East of this, in the south-eastern parts

of the United States (the deeper shade on the maps), the temperatures are semitropical and too high for the profitable growth of the grains and grasses.

These green belts on the Continent of North America, cover the zones which have climates and productions similar to those of North, West, and Central Europe—the British Islands, Norway, Sweden, Russia, Germany, Denmark, France, Holland, Belgium, Switzerland, and Northern Italy.

In examining the maps it must be remembered that the grains produce more abundant, surer and better crops near their Northern limits; wheat, barley, oats, peas, &c., yield more per acre in Canada than in any part of the States; more in England and Prussia than south of these countries; and even maize produces more per acre in Massachusetts, New York, and in some districts north of the St. Lawrence, than in Illinois or farther South in its native climates.

To show more conveniently the continents, side by side, and the zones of grains and grasses on each, with the intervening oceans and their warm and cold currents described in the work, the maps are necessarily drawn on Mercator's projection, which, assuming a given scale for the equator, enlarges the parts of the earth to the North and South. This, however, need not mislead even the unscientific reader; besides, the areas of Canada, the United States and Europe are given in the text.

In drawing the zones of the grains and grasses in Canada, the author has consulted the published works of the explorers of those regions, and has also availed himself of the testimony of travellers, residents and employées of the Hudson Bay Company, whom he has met, and with whom he has been in communication for many years; but, in describing the desert areas and the regions of insufficient rain, and in tracing their outlines, his authorities are American standard authors, including travellers, &c.

CLIMATES, PRODUCTIONS, AND RESOURCES OF CANADA.

I. SUPERFICIAL AREA.

THE superficial area of Canada* is about 3,500,000 square miles; that of the United States (including Alaska), 3,390,000; of Europe, 3,650,000. This immense country lies between the 53rd and the 141st meridians † west, and extends from the latitude of Rome in Italy to the Arctic Ocean. We cannot form a correct estimate of the agricultural capabilities and the varied resources of this vast territory without reference to the bays, arms of the sea, and to the great and innumerable small lakes, such marked characteristic features of the Country; for these great bodies of water add immensely to the value of our possessions, climatologically and agriculturally. Without them we should have vast regions of comparatively little value, as in Africa, Asia, and the United States west of the Mississippi, where large tracts of land, far from water—either of those inlets from seas or from great lakes and rivers—are arid deserts, made such through protracted summer droughts and the absence of humidity in the air; but we have not included these waters in the area given above. The fisheries in these and on the coasts make them more valuable than an equal extent of agricultural land. They are, too, the finest nurseries for seamen ever possessed by a nation.

II. EXTERNAL ASPECTS.

THE external aspects of this immense territory are of the most favourable description. It is washed by the three great Oceans,—Atlantic, Pacific and Arctic,—giving, in its deep indentations around the shores of its islands, gulfs and bays, a sea-coast of eleven thousand miles, abounding in the most prolific fisheries, from the vast gulf of our own magnificent St. Lawrence and the banks of Newfoundland, along the shores of Labrador and Hudson's Bay, through the Arctic and down the Pacific coast, over seas more thickly studded with islands than the Grecian Archipelago, to Vancouver, the Queen of the Pacific. These oceans, too, by their winds, vapours and currents, have a most favourable influence upon the fertility and salubrity of this portion of the Continent.

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* Canada now embraces the whole of British America except Newfoundland and Prince Edward Island.

† The boundary between Canada and Alaska is the 141st meridian (w.) and along the coast south to the point where Portland Channel touches the 56th lat.—thence down the channel. The line runs along the summit of the mountains, but is never to go more than 10 leagues (marine) from the coast. (Dall's Alaska, p. 245.)

The gulf or tropical stream of warm water—the temperature of which is 20 to 30 degrees above that of the surrounding ocean—flowing upon the western coast of Europe, causes, with the south-west winds which blow off its surface, an elevation of the temperature of the west of Europe above that of the eastern coast of America (the temperature of which is depressed by the Arctic current) in similar latitudes, of eight degrees in latitude 41°, eleven and a half in latitude 51°, and twenty-five in latitude 58°. Similar causes in operation in the Pacific give an equal elevation of temperature to the Pacific over the Atlantic coasts,—the Arctic currents of wind and water chilling the one and the tropic currents warming the other. From Vancouver, in latitude 49°, to Sitka, in 57°, the temperature is as high and as uniform as in corresponding latitudes in the west of Europe, except where the vicinity of mountains may modify the prevailing climatological conditions. Sir John Richardson says "the climate of Sitka is much warmer than that of Europe in the same parallel." (Arctic Expedition, vol. ii, page 279, quoted from Bongard.)

III. ITS POSITION ON THE GLOBE.

If we were entirely unacquainted with the country lying north of the United States, the first impression produced upon the mind of a geographer, in looking over a map of North America, would be, that a territory embraced between the same parallels as Europe, from Rome to the arctic seas, warmed by the same sun, and similarly situated with respect to the oceans, must possess vast tracts of land valuable for agricultural purposes, must, in fact, be not much dissimilar from Europe in climate and soil. The geographer would picture to himself great rivers and lakes of the purest water and frequent summer showers, because it is the region of summer rains in contrast with the rainless regions to the south-west; extended forests and prairies of luxuriant grasses, because he is accustomed to find these in similar positions on the Eastern Continent. The forests and grasses are the necessary fruits of the heat and humidity of the summers, as the desert areas to the south, between the Mississippi and the Pacific, are the results of the normal conditions of climate, the absence of summer rains being the chief deficiency.

Canada is in the latitudes of the most valuable cereals and grasses, and, consequently, where the appropriate food, and in the greatest abundance, is found for man and beast. It is, in climates and productions, similar to the region in the old world, most favourable for the ox, the sheep and the horse. It is the latitude, too, in which man attains the greatest energy of body and mind. It is the latitude from which have sprung the conquering races, and the races that rule the rest of the world. It is the latitude from which the migrating races in modern as in more ancient times have come, for as man is here most robust, so here he multiplies

most rapidly. While the more feeble races of the south of Europe scarcely keep good their numbers, the northern nations are constantly sending out their surplus population by thousands and even by hundreds of thousands.

The inhabitants of the British Islands, including those who migrate, and their natural increase, double their numbers in 25 years, the Germans in 76, the French in not less than 136, the Portuguese in 238, and the Turks in 555. The north-west of North America resembles in climate and soil the north-west of Europe, and Europe has a population of 80 to the square mile; at this ratio British America could sustain a population of 280,000,000, that of Europe being 300,000,000. England has 400 and Belgium 430 to the square mile. But, instead of taking 80 to the square mile for Canada, one-fifth of that of England, if we reduce this one-half, we shall still have a territory capable of sustaining a population of 140,000,000. These are merely possibilities; but we believe we are not over-estimating the capabilities of Canada, for she resembles Europe in position, in climate, and in the races which do now and are likely to inhabit her fertile provinces.

If it be said that large areas of the north and north-east are sterile through the cold, we reply that within the United States there are even more extensive territories rendered inhospitable from the absence of summer rains. That half of the Republic lying west of the hundredth degree of longitude, except portions on the Pacific, is one of the most hopeless deserts on the globe. The prolific fisheries off the coasts of the sterile portions of the Dominion, are, to a great extent, a compensation for the barrenness of the soil; for there is a broad border of ocean more valuable than the most fertile land; but neither on nor around the desert areas of the United States are there any redeeming features except minerals, in which our own barren lands are reported equally rich.

IV. LATITUDES.

CANADA extends from the latitude of Rome in Italy to that of North Cape in Norway, and has the climates of Europe from the Mediterranean to the Arctic. The peach, plum, quince, apricot and grape, readily ripen in our southern province in the open air. In general terms, it may be stated that our climate resembles that of Central, Western and North-Western Europe, with a higher summer temperature and more summer rain; the spring and early summer months being cool, favour the cereals and grasses, and the high summer temperatures the semitropical plants and fruits; hence the great variety of our products, and the great fertility of the soil. The whole family of the cucurbitaceæ—the squash, the pumpkin, the melon, the cucumber, &c.—come to maturity in the open fields throughout the valley of the St. Lawrence and lakes, as also on the Red, Assiniboine and Saskatchewan rivers. Indian corn, or maize, which

will not ripen in England and seldom in Paris (lat. 48° 50′), is a field crop over vast areas in the valley of the St. Lawrence and even in the nor'h-west matures as high as latitude 54°, north of the parallel of Liverpool,—and this cereal requires a summer temperature of 65° degrees with one month at 67° ; so exacting is it as to temperature, that it often fails to ripen in the north of France through a deficiency of half a degree.

V. THE CLIMATES OF CANADA.—TEMPERATURE AND RAIN-FALL.

How the widespread erroneous opinions as to the climates of Canada could have originated or been entertained, has always appeared quite unaccountable. If its position on the globe—its southern portions in the same latitudes as Corsica, the northern provinces of Spain, Italy, and Turkey, farther south than Austria, France, Sardinia, Lombardy, Venice or Genoa—were not sufficient to save even the unscientific from mistakes on this subject, the vegetable products of the country are a simple and sure index of its climates. Besides those plants named in the previous chapter, and the abundant crops of the great staples of the temperate zones, the reader will find in another place a brief list of the natural flora of the country, which will show more forcibly than a volume of argument the climatic conditions of Canada.

Southern Illinois is in latitude 37°, and Central in 40° ; Kansas lies south of 40°, and Missouri, the next State on the east, from latitude 36° to 41° ; London (England) is in lat. 51° 29′ ; Liverpool, 53° 25′ ; Edinburgh, 56° 5′; Paris, 48° 50′; Prussia, north of 50° ; the northern part of Africa, Cape Bon, 38°; the great desert of Sahara, between the parallels of 20° and 38° ; and the great American desert, between 23° and 48°. The desert area of the Eastern Continent would, doubtless, even in Europe, extend as far north as the American, were it not checked by the Mediterranean. East of that sea it rises in Independent Tartary and Mongolia as high as the American desert.

Fully one half the area of the United States lies west of the 98th meridian. Having four to five months—the agricultural months, be it remembered—without rain or with an insufficiency, it is mostly devoid of vegetation except the cactus in the south, and artemisia, or sage of the desert, in the north—true indices of a rainless region. As an agricultural country it is worthless, except where artificial irrigation can be made to supply the deficiency, supposing water could be got for that purpose. Even then the saline properties of the soil would, over vast areas, be destructive of vegetation. Professor Wharton, an American writer, some fifteen or twenty years since, maintained that they had reached the limits westward of arable land ; and this is the testimony of every traveller over those regions. Emigration must now turn north-westward, from the country of

summer droughts to that of summer rains in the great fertile valleys of British America. Sir John Richardson (Arc. Exp., vol. ii., p. 267) informs us that wheat is grown with success in latitude 60° 5′, near the borders of Great Slave Lake, where the summer temperature is 65°, that of London being 61°.* Bishop Taché found it growing up to 62° on Great Slave Lake, and farther west it ripens at a higher latitude. It grows freely on the banks of the Saskatchewan in latitude 54°, and luxuriantly in the valleys of the Assiniboine and Red Rivers. Sir John Franklin found Indian corn ripening in latitude 54°, west of Winnipeg. Barley ripens well at Fort Norman in latitude 65° (400 miles north of the Orkneys and the capital of Sweden, and 350 miles north of the capitals of Norway and Russia). South of latitude 60° 5′, where "wheat ripens well," we have an area in Canada probably greater than the entire arable land of the United States, and yet, 5° north of this, barley ripens, potatoes and turnips grow, and the luxuriant pastures invite the bison and the deer. No doubt when these northern countries shall have been cleared of the forest and the land drained, these plants will here, as in Europe, go to a much higher latitude.

We know that where wheat ripens in such a climate, we have the best region for the grasses, cereals, coarser grains, and root crops generally. It is true that the climates east of these posts, nearer Hudson's Bay, are less propitious. The cold arctic currents which sweep around that bay and down the coast of Labrador, lower the temperature. But these arctic streams come to us burdened with a superabundance of food in the countless swarms of fish which, after feeding their numerous enemies in northern seas, supply luxuries for millions of the human family in the temperate zones. We surely have enough agricultural land, and can well afford these north-eastern preserves for fishing and hunting grounds, and as nurseries for hardy seamen.

The summer isothermal of 70°, which at the Atlantic coast crosses Long Island in latitude 41°, passes through Pittsburg (Pennsylvania), latitude 40° 32′, Cleveland, latitude 41°, and Chicago, 42°, rises, on the Saskatchewan, to latitude 52° (in long. 110°), but sinks again on the high plateau of the desert areas of the United States to latitude 35°, in long. 105°; rises to lat. 47° in Oregon, and falls again to lat. 30° through California. The isothermal of 65°, for the summer, which, on the Atlantic coast, is off Boston (in lat. 42°) rises through Canada to north of Quebec (and Quebec is in lat. 46° 49′), crosses the Red River at latitude 50° on the 97th meridian, and Mackenzie's River near the 60th parallel.

The summer temperatures are those of chief importance for agricultural purposes. The cold of winter has no effect upon those annuals for which

* Wheat will ripen in high latitudes inland with a summer at 60°, one month being at 63°, and even at 58° in England and British Columbia.

the summers are long enough and warm enough to secure their maturity. But the frosts of winter have a powerful effect in pulverizing the soil, and the snowy covering protects the ground from the winds and sun of the late months of winter and early spring; then the gradual melting of the snow fills the soil with moisture so necessary for seeds and plants, presenting such a contrast to many countries in the south of Europe and many western States, where the ground, exposed for months without such a covering, is too dry for vegetation. Our forest trees—some of them almost semi-tropical, as the tulip (*lireodendron*), pepperidge (*nyssa multiflora*), both large forest trees, the grape-vine, &c.—have stood the frosts of centuries and still flourish, for some of these monarchs of the woods have been found five hundred years old.

In running the eye over the table of temperatures and rain (Appendix A), it will at once be seen what extended areas in Canada have climates not much dissimilar from Western and Central Europe; the chief difference being more heat and more rain in summer—all important elements in climates. Toronto has nearly the summer of Berlin and Paris; Hamilton (lat. 43°), Montreal (45°), and Quebec (47°), that of Bordeaux in the south-west of France (lat. 44°). But the summer rains in Canada (see App. A) are at least one-third more than in Western and Central Europe—Berlin seven inches, Paris and London six. Throughout the valley of the St. Lawrence we may put the rain-fall for the three summer months at from eight to ten inches, many parts of it, with Manitoba and British Columbia, having nearer twelve than ten. With the greater heat which causes a rapid evaporation, these copious rains are of vast importance, and explain the extraordinary growth of vegetation throughout these countries.

VI. WOOD-LAND, PRAIRIE, AND DESERT.*

That portion of the North American continent extending from the Atlantic more than 3000 miles in the latitude of Canada, but much less south of this, and from the Gulf of Mexico for 1500 miles northward, is covered with a mixed forest of coniferæ and deciduous trees, which is unparalleled in extent, and in the variety and value of its woods. The most remarkable part of this great mixed forest occupies the valley of the St. Lawrence and its tributaries.

These forests, so beautiful and grand in their primitive state, have a value quite independently of their money worth. They have a most powerful and favourable influence upon the climates of the country, check evaporation, and keep the water longer in the soil, thus supplying the roots of plants, feeding the springs and streams, &c. In France, Germany, Austria and Russia—in truth, in most countries of the Old World, the governments,

* This should be read in connection with Chapter VII.

on the recommendation of commissions of scientific men, have ordered the re-setting of forest trees.

West of this vast forest, within the area of the United States, is the treeless region. The Mississippi may be taken as near the boundary of these two zones marked with such different features, the forest in many places not reaching that river, in others extending beyond it, and again reappearing on the Pacific coast. East of the Mississippi trees appear first along the water-courses and on soils retentive of moisture, being still absent on the uplands and sandy plains. To the north, this immense treeless region runs, in the country of the upper Missouri (longitude 110° west), north of latitude 50°. Lieut. Butler, in his report just published, speaks of these sandy plains as a part of that great desert extending thence to Texas through Montana, Wyoming, Colorado and New Mexico, 1,400 miles. Throughout these immense areas there is either a total absence of rain in summer, as in the desert parts, or an insufficiency, as on the prairies. The grasses which cover these dry up in summer, but their roots, forming a deep matted sod, have vitality enough to put forth fresh shoots under the rains of spring and autumn; trees, however, which are withered up by the droughts and arid winds of summer, have no such vitality.

Vast portions of America, Africa, Asia and Australia are destitute of trees, while other equally extensive regions are covered with forests. These treeless zones lie in similar positions on the Continents, except where modified by physical conditions, beginning near the same latitudes on the western coasts and running north-eastward in the Northern Hemisphere and south-eastward in the Southern, in the direction of the prevailing winds.

In the Old World (for Europe, Asia and Africa must, in considering climates, be taken as one body of land) these treeless and mainly desert regions begin on the west coast of Africa, north of the twentieth parallel, and run north-eastward or east by north, 9000 miles over Africa, Palestine, Northern Arabia, and Independent Tartary to latitude 50° in Mongolia, ending in the great desert of Cobi or Manshire Tartary. In North America we have a similar desert-treeless region, beginning in Old and New California and on the coasts of Mexico (in the same latitudes as the African desert), and extending to the Mississippi and beyond it, on the east, and to British America on the north. The winds over these desert areas on both Continents blow almost invariably in summer from some point near the south-west towards the north-east. These portions of the Continents are destitute mainly of summer rains, but have high summer temperatures. North of these are the regions of summer rains—Canada (under this name we include the whole of British America, from the Atlantic to the Pacific) in the New World and Europe in the Old. Upon the modifications caused in these desert areas by the high lands of Mexico and the vast Mediterranean Sea we cannot here enter, but may merely state that the

mountains of Mexico limit the deserts there, and that great sea north of Africa causes a more humid air in the south of Europe limiting the deserts in that direction ; yet Spain, Italy, Sicily, and the whole country north-eastward into Hungary, frequently suffer from summer droughts.

The reason, as a permanent cause, often assigned for these portions of the Continent being destitute of trees—namely, the prairie fires—cannot for a moment bear investigation. "Remove the cause—the fires—and trees will grow up," say land speculators ; and every year the seeds of forest trees are sown, and saplings in thousands taken from Canada are planted, in the vain attempt to produce what nature has denied them, or what would perish even if it existed, except in favoured localities.

Fires were naturally suggested to the first rude settlers, to whom the evidence of sight is the chief guide, as the only cause. In many parts of the African, Asiatic and American deserts and prairies there are no fires ; still they are treeless. In other countries fires are as frequent where forests are permanent, or, if burned down, as during last year in some parts of Canada, young trees immediately grow up again. The existence of forests over a region of 2000 miles by 1000, and their failure *where, and only where*, the summer rains fail and the arid winds prevail, ought to have suggested the explanation. That the prairie fires, sweeping over extended areas, may have kept trees from some localities, near rivers or on retentive soils, is possible ; but such exceptions, limited and local, have no weight in opposition to the fact that millions of square miles have remained, through all the ages of history, desert and treeless on the borders of other equally extensive areas covered with dense forests. The climates which have produced these two distinct results over those regions have remained permanent for ages, and will remain permanent in the future, unless changes supervene in the entire solar system ; but for the calculation of such imaginary phenomena, astronomy furnishes no data. We may infer, therefore, that those conditions of climate—heat and humidity in the one case, and heat and aridity in the other—remaining the same, their effects —forests and treeless regions—will be permanent expressions of those fixed efficient causes.

We append a few thoughts naturally suggested by what has been said or as applications, limitations, or modifications of the facts and arguments here adduced.

1. It is questionable whether there is an acre of what a Canadian or English farmer would call good land for wheat and the cultivable grasses between the Mississippi and the Pacific slope. Climate, not soil, is the chief consideration ; and the want of rain, the remarkable aridity of the air, saline soils, cold nights, &c., render it impossible that it could, for the grains and grasses, equal Canadian and English lands. No doubt, as we go north into Minnesota and Wisconsin, these deteriorating agencies

are less potent. Prairies in high latitudes, where, as in Manitoba,* the rain-fall is greatly in excess of the evaporation, have usually sufficient moisture in the ground, with the frequent copious rains, for agricultural purposes.

2. Some cultivated grains have so great a range, north and south, by a proper adjustment to the earlier or later months of growth, that they may be produced in climates quite inferior. But plants which require the summer for their growth and maturity, and especially pastures and meadows, must fail in such climates.

3. Wheat and other grains produce twice as much in England as in Central France; wheat, barley, oats, peas and the grasses, yield much more in Canada than in the best agricultural districts of the States. The crops, too, are surer and of better quality.

4. The grasses almost entirely fail—as cultivated grasses (pastures and meadows) over the western prairies, and, further south timothy runs to a coarse cane; even maize produces less in its native climates than near its northern limits, running in the south more to cane than to grain.

5. Wheat will ripen in a summer temperature of 57°, with one month at 58°, as at Aberdeen, in Scotland. In interior climates, as on the Saskatchewan and Mackenzie rivers, it requires a summer of 60° to 65°. In England it ripens at a temperature of 60°, at Kasan, in Russia, (near lat. 56°), at 60° 9′; with a temperature above 70° it fails to fill, and soon ripens or dries up. Maize requires a summer of 65°, with one month at 67° (the most favourable climate for both maize and grapes); hence the immense districts in the North-West, in Canada, favourable for wheat, oats and peas —barley, rye, the grasses, and many root crops going five to seven degrees farther north than wheat.

Great Britain, one of the most favoured regions for these products, has a summer of about 60° to 62° (London, 61° 9′, Glasgow, 60°, Swansea, 62°, Dublin, 60°, Liverpool, 57° 6′, the central counties of England, 62°).

Canadian summers, necessarily varied over such a vast region, may be stated at 60° to 70° (Halifax, 60° 8′, Fredericton, New Brunswick, 64° 6′, Quebec, 69° 1′, Montreal, 70° 8′, Toronto, 67° 8′, Ancaster, near the head of Lake Ontario, 65° 1′, the Muskoka country, 100 miles north of Toronto, 68° to 69°, Manitoba, 67° to 70°, Vancouver, 61° 5′). The summers of Illinois, Missouri, Kansas, and the whole country east and north-east of the deserts, are ten to fifteen degrees higher than the best districts for the grains and grasses. Central Illinois has a summer of 74°; Ohio, 70° to 74°; Iowa, 72° to 78°; Kansas and Missouri, higher still. These temperatures are ten degrees too high for wheat, barley, &c., and the cultivable grasses. Hence the beginning of the summer heat is the end of the further growth of these plants; they immediately wither up.

* There are 120,000 square miles of Prairie in and west of Manitoba.

Add to this the summer droughts, arid winds, and the other attendants of such prairies, and we have a climate destructive of the great staples of the temperate zones.

By reference to the maps the reader will see the most favoured regions for wheat, grain, grasses, and, of course, for pastures and meadows, in a broad zone extending from south-east to north-west across the Continent in the direction of the summer isothermal lines, and in the same position and near the same latitudes as the chief zone for these great staples in the Old World; the best part, and vastly the greater part of this zone, is in Canada.

VII. THE CLIMATES OF CANADA AS INDICATED BY HER NATURAL PRODUCTIONS.

Where certain forest trees, vines and plants have fastened themselves without the care of man, they give us the best proofs of those uniform conditions of heat and moisture favourable for their growth. Many of the trees in the forests of Canada, the most remarkable forests of deciduous or leaf-falling trees on the globe, require a summer temperature of 67° of Fahrenheit and a copious fall of rain. The western coasts of both Continents, in the Old and New Worlds, in high latitudes, have the necessary moisture, but not the summer heat; hence the absence there of leaf-falling trees, except certain species and in favoured localities. The prairies, both east and west of the Mississippi, as also the deserts of the Old and New Worlds, have the required summer heat, but not the moisture; and those regions are destitute of all trees.

Climates fatal to forest trees could not be favourable for fruit trees, nor indeed for any agricultural products. Hence the absence of orchards and the frequent failures of crops throughout the Western States from the deficiency of summer rains.

The high summer temperatures and abundant summer rains in Canada are unquestionably those conditions of climate necessary to produce these peculiar trees.

We take the sugar maple (*acer saccharinum*) as our starting point for illustration. This forest tree is found over the greater part of the valley of the St. Lawrence up to latitude 49°, in the Red River north of 49°, and the ash-leafed maple (*n. flaxinifolium*) on the Saskatchewan, lat. 54°. It requires a summer of from 65° to 67°, and copious rains. The summer temperatures of England and the north of France are too low for this tree (London, 61°, Liverpool, 57°, Paris, 64°). The British Islands have the necessary rain but not the heat; the western prairies have the heat but not the rain. This beautiful tree attains over much of the valley of the St. Lawrence, a height of 60 to 90 feet, and 4 to 8 in circumference, and is found 120 feet high and 12 in circumference between lakes Ontario and Huron. Besides the sugar maple, there are four other varieties, one especially (*a. dasycarpum*), nearly as large as the one described above.

Wherever the maple grows, the wild vine may be found running to the tops of ordinary forest trees, and in favourable localities sometimes attaining six inches in diameter. This may be taken as a rough estimate of the extent of country—twice the size of Great Britain in the valley of the St. Lawrence alone—in which the grape may be cultivated, for our vine growers are getting hardier varieties, based on the native vine.

The Canadian forests are made up of some sixty trees, with numerous shrubs. We name only a few. The black walnut (*juglans nigra*), in the western and south-western parts of Canada, has an average height of 120 feet, and 70 to the first limb. Trunks six feet in diameter and 18 in circumference were not uncommon in the pristine forests. The chestnut (*castanea vesca*) attains a height of 100 feet, and three in diameter; the butternut (*juglans cinerea*) is also one of the largest forest trees, widely diffused over Canada, with 60 to 70 feet of trunk free from limbs. The gigantic oaks and elms are too well known to require description, and are sometimes found 18 and even 22 feet in circumference.

The plane-tree (*platanus occidentalis*), is found in the southern part of the Dominion 60 inches in diameter and 60 feet to the first limb; the white wood (*liriodendron tulipifera*), a variety of the gorgeous magnolia, equal in height and size to the last-named; the pepperidge, or sour gum tree (*nyssa multiflora*), 100 feet high; the flowering dog wood (*cornus florida*), 30 feet high and 8 inches in diameter; the red cedar (*juniperus virginiana*), 24 inches in diameter; the sassafras (*s. officinale*), 60 feet high;—the climate that produces such forests, with a hundred varieties of trees and shrubs, needs no further defence with the botanist, nor even with those but partially acquainted with the productions of the earth and the localities where they grow. The author, in 1862, made a very full collection of the woods and plants of Canada for the International Exhibition in London, with a view to correct the erroneous opinions so widely entertained as to our climate. Several eminent botanists, amongst others Sir William Hooker, director of the Kew Gardens, and Mr. Lindley, made special reference to the collection, as illustrating this very subject. Samples of some sixty varieties of Canadian woods were presented to the Kew Gardens, the British Museum, the Admiralty, to Lloyd's in London, the Industrial Museum of Edinburgh, and to the chief governments of Europe. These were highly prized as most irrefragable proofs of a high summer temperature, as well as for their commercial value.

VIII. CANADA COMPARED WITH CORRESPONDING REGIONS OF THE OLD WORLD AND WITH THE UNITED STATES.

The productions of Canada are mostly similar to those of Western, North-Western, and Central Europe, the great staples being those of the middle and higher parts of the temperate zones. The cereals,

grasses, root crops and hardier fruits of Europe, find here, more than in any other part of the American Continent, their appropriate climates. The three decennial census of Canada show that we produce more abundant and surer crops of the cereals, grains, grasses and root crops, and those of better quality, than any of the States of the Republic. This is true of wheat, oats, barley, peas, rye, most of the ordinary root crops (as potatoes, turnips, beets, carrots, &c.), and the hardier fruits. The Canadian Census of 1851 shows that Canada even then produced one-sixth as much wheat as all the thirty-one States and four territories, one-half as much peas, more than one-seventh as much oats, more than one-fourth as much barley, and nearly one-eighth as much hay as the entire Republic.

The census of 1860 and 1861 was still more favourable to Canada; for in wheat, she had one-sixth, in oats one-fourth to one-fifth, in barley a third, and in peas nearly equalled, the 34 States and seven territories.

Any one acquainted with the agricultural products of Europe, and with the climates adapted to them, will at once see the cause of this. The parts of Europe north of the parallel of 45° (and Canada goes to 42°) embrace the British Islands, Norway, Sweden, Denmark, Prussia, Belgium, Holland, Austria, Hungary, Switzerland, Lombardy, part of Sardinia, and most of France and Russia. The whole of the American Union, east of the lakes, is south of 45°, except that part of Maine surrendered under the Ashburton Treaty. Very small portions of Wisconsin and Michigan, and part of Minnesota, are north of this parallel. If it be said that America is very different in climate from Europe, we answer, that that difference is unfavourable to the United States and favourable to Canada, as the facts stated below will show. America, it is said, is colder than Europe. It would be difficult to state the climatal conditions of the two Continents more loosely and erroneously. From the influence of the tropical currents of water and wind, the western coasts of both Continents are warmer than the eastern; but the summer temperatures, which are of chief importance in agriculture, are higher, as we get a little from the Atlantic coast, in America than in Europe, and too high throughout the United States for the great staples of the temperate zones. The summer of the British Islands is from 57° to 62°; the summer of Illinois is thirteen degrees ·her than this; Ohio has a summer of 70° to 74°; Iowa, still higher, 78°; Kansas and Missouri, higher still.

·t high temperatures and a burning sun are not the only enemies ·· which the agriculturist so far south has to contend,—the want of rain is another and even more grievous defect in the climate in those parts of the United States; for high summer temperatures, with heavy rains, are conditions of climate favouring tropical plants, but high temperatures, without rain, are destructive of all vegetation; and high tempera-

tures, with an insufficiency of rain, give only imperfect crops. Those parts of the States just named very much resemble Palestine, Arabia, Persia, Syria, and Independent Tartary. Both regions are similarly situated on the Continents, both are in the zones of the summer droughts, high temperatures, arid winds, and rapid evaporation, but, with this important feature in favour of the Asiatic countries, they lie near the ocean and Mediterranean Sea, which render the atmosphere more humid, and modify the droughts.

Nor would the effects of the want of summer rains be fully stated without reference to the rapid evaporation in countries situated like those named. In England the evaporation in summer is from 40 to 60 *per cent.* of the rain-fall, leaving from 60 to 40 *per cent.* in the soil, affording moisture to plants while working its way slowly to the rivers. In Baltimore (lat. 39° 18′), although near the ocean, the evaporation in summer is double the rain-fall. Inland, in Missouri, Kansas, Illinois, Iowa, and the whole region thence to the Pacific, the evaporation is much more rapid than on the sea coast. These States, too, lie east of the great desert and semi-deserts, stretching from the 98th meridian (the western boundary of Iowa and Minnesota) to the Pacific. The prevailing summer winds on this part of the Continent, being from the west and south-west, blow almost uniformly over the States lying eastward and north-eastward, and, being arid burning winds, parch the land and wither up every green thing. Minnesota and Wisconsin are less, but only less, affected by these winds, for they border on those immense inland seas, whose waters, from their great depth, being cool even during the summer months, check the evaporation and increase the rain-fall.

We need not here refer to some portions of the middle States, which, from their altitude or other causes, have cooler climates, or to California, where the winter and early spring are favourable for the growth of wheat, but not for the other grains, the grasses, or roots. We are not dealing with exceptional cases. The greater portions of the States east of the Mississippi lie too far south for the chief staples of the temperate zones. We make very little account, agriculturally, of the regions in the Republic west of that river, for reasons elsewhere stated. As a general rule, the grasses (the timothy, clover, &c., and grasses that make our pastures and meadows) fail south of latitude 39° east of the Mississippi, and even to lat. 50° west of it; and where the grasses fail, the dairy, the sheep, and herds of cattle, with all their accompanying blessings, must be given up as a chief element in farming; for the wild prairie grasses of those regions, when ploughed up, cannot be re-set, and therefore are of no value as cultivable grasses. Hence the farmer from the higher and middle latitudes of Europe must, in going to the western and south-western States, submit to great changes in his mode of agriculture.

EXTRACTS FROM BLODGET'S "CLIMATOLOGY," AND PHILPOT'S "GUIDE TO CANADA."

"The cultivated cereal grains and grasses (except Indian corn) all come to us through the cool and humid equable climates of the west of Europe. For this reason their most successful districts are in the eastern parts of the United States, and we have nothing which will bear the heat of the Southern States for the summer, the grains ripening before it (the summer heat) comes on, and the grasses being destroyed by it."—p. 445.

"The grasses are nearly equal to the grains in economic importance [probably quite equal, if we take into account the flocks, herds, and dairy,] and nearly all the cultivable forms are derived from Europe. They find decided limitations, consequently (in the United States), and are far from supplying the full requirement here. The cultivable turf (pastures and meadows) belongs most decidedly to the districts of equally distributed rains above the 39th parallel [the latitude of the central parts of Illinois, Indiana and Ohio, and the northern part of Missouri and Kansas], and it is rare from Baltimore [lat. 39° 18'] to Washington [although both are near the Atlantic], unless carefully preserved, as also at all points near this latitude east of the Mississippi. Within the area north of the 39th parallel there are many limitations; *and it may be more precisely* set down *as coincident with the heavy mixed forest, failing where that fails* either on the sandy tracts or prairies. In sandy plains in New Jersey, and in some parts of New England, the English grasses (the grasses that make our pastures and meadows) fail. But on the prairies of some of the States east of the Mississippi, the climate assists to limit them *through high summer temperature and long periods of droughts*. West of the Mississippi the climate is still less favourable; and, as the soil has less of the retentive character in receding from the Mississippi, the favourite cultivated turf almost wholly fails west of Minnesota, as high as the 49th parallel."—p. 449.

"In Central Russia, near Kasan in the Baltic Provinces, [on the Volga, lat. 55° 48', with a summer temperature of 62°, 4'] in the British Islands, and in the Canadas, the capacity (for wheat) is most fully tested for commercial purposes, and the most ample quantities are grown. Probably the plains of the *Saskatchewan* and the *Pacific coast at Puget Sound* and *Vancouver's Island*, will furnish similar districts."—p. 446.

"I know of no better field for the industrious emigrant [than Canada], and this not only on account of its nearness to the mother country, but I think its climate and the occupations engaged in by the colonists are more thoroughly adapted to the Englishman than those of any other country."—H. J. Philpot's "Guide to Canada," p. 7.

Nor can we admit the force of the objection that such comparisons are fallacious. The orange, the lemon, and certain plants of Southern Europe, will not live through a Canadian winter, and, therefore, it is said, a comparison drawn from latitudes has no weight.

The temperatures of the summer months are those of chief importance in agriculture and horticulture. The winters have no unfavourable effect upon plants for the maturity of which the summers are long enough and warm enough; nay, the intervention of winters, such as prevail throughout Canada, with the temperature low enough to secure a covering of snow, is good both for the plant and the soil. The frosts of winter, too, says a Scotch agriculturist, who also had long been a practical farmer in Britain, leave the land in a very friable state and in better order than any number of ploughings could make it. The winter grains, the grasses, the roots of trees, and especially of shrubs, are protected from the wind and the sun; the soil, too, being covered with snow till the sun is warm enough to start vegetation, is not dried up, as we find it in Southern Europe, in late winter and early spring. Then the gradual melting of the snow fills the earth with moisture, so necessary for the germination of seeds and plants. The rains of spring and early summer follow: these favouring circumstances, accompanied by moderate temperatures, render Canada, as a grazing and grain-growing country, immeasurably superior to Southern Europe. "Canadian wheat," says Marshall, p. 76, "is one of the finest in the world; oats, barley, maize, and other grains, yield excellent crops." These grains, with the rich pastures and meadows, herds of horn-cattle, sheep and horses, are not the great staples along the shores of the Mediterranean, as in Canada.

After the cool months of spring and early summer, so favourable for the hardier grains and grasses, the high temperatures of July and August mature even subtropical plants throughout the valley of the St. Lawrence and far up into the north-west. The melon, pumpkin, squash, tomato, cucumber, &c., come to great perfection in the open air. Hence the great variety of vegetable products in Canada, from the tender plants of tropical and semi-tropical origin to the hardier ones of the middle and higher temperate zones.

In countries such as those of Southern Europe and the Western States, the ground is usually dried by exposure to the sun and winds before the warmth of spring starts vegetation; this is often followed by great heat, summer droughts, arid winds and rapid evaporation, parching the land and withering the plants. Besides, climates favourable for the orange, lemon, and such tropical fruits and plants as find a genial home around the shores of the Mediterranean, are destructive of others even more valuable.

The long and severe winters of Canada are, by strangers, supposed to be almost insuperable obstacles to keeping large herds of cattle. We cannot here discuss the question farther than to refer to the facts that Canadian farmers keep more stock than American, that immense numbers of horn-cattle, sheep and horses, are exported every year to the United States, and that hay, from low down the St. Lawrence, is sent, more than a thousand miles, to Chicago, on the borders of the great prairies of the west. In Northern Europe, even where there may be no snow, grasses grow very little or not at all during that part of the year covered with snow in Canada; and it would no doubt be better both for the soil and plants in those countries had they a similar protection from the winds and sun of winter and spring.

Marshall, in his work on Canada, says he found "excellent Durham, Devon, and Ayrshire cattle; Cotswold and Leicester sheep; Essex, Suffolk and other well-known breeds of pigs; and many excellent draught and road horses. I was not prepared for the evidence of such widespread interest in this branch of the farmer's occupation, and such general excellence of results as I found here."—p. 77.

In this connection it should not be forgotten that the chief grazing and grain-growing countries of Europe are in the higher parts of the temperate zone, and must, from similar causes, be in corresponding parts in America; in other words, in Canada.

The length of winter in such climates, it is often said by Europeans, limits very much the period of out-door operations. Professor Johnson quotes the opinion of sixty-two experienced farmers to this effect—that the frosts of winter open and make friable the soil to such a degree that the labour expended upon it goes much farther than in England; that one ploughing is, in fact, so far as the mechanical loosening of the soil is concerned, equal to two in countries without such frosts; that the rains in Canada falling more in short showers than in protracted rains, as in Great Britain and Ireland, the number of working days is greater in the spring months in the former than in the latter country; that the rapidity with which crops come to maturity leaves a longer period for ploughing and out-door work, both before the seed is sown and after the crops are reaped; that by stabling and keeping together the stock, more manure is saved. Finally, there is much work which can be far better done in winter than in summer, as the felling and cutting of trees, so much easier with the frost in the wood, clearing the land, hauling manure to the remoter parts of the farm, fencing and wood from swamps and places difficult of access in summer, conveying produce to market at distances with a speed and in quantities which would not be practicable on wheels, and many other things known only to those living in such countries.

IX. INFLUENCES OF CLIMATES ON THE RACES OF MEN.

HEAT and humidity are the chief agencies in rendering climates and soils favourable for the productions of the earth, and these have remained permanent throughout all the ages of history. Laplace has demonstrated that the temperature of the earth could not have changed during the vast periods over which astronomical calculations have been extended, and that none can occur without affecting the movements of the entire planetary system. Climates are permanently the same, and their effects upon the animal and vegetable kingdoms in the Old World will be reproduced in the New. Climates, here as there, will have the same effect upon the features, complexion and general physique of man. Those regions in the Old World lying in latitudes and in position similar to the greater part of the United States are inferior, for the abode of man, to those which correspond with Canada. Time has not yet been given in the New World to show the full effects of the causes which have produced those marked and permanent characteristics in the Old; but here, as there, similar causes must be followed by corresponding effects. It might be a bold prediction to assert that another China in the mould and features of its inhabitants will be reproduced in portions of the United States. In latitude, in climates, in position on the Continent, and in natural productions, they are the same, and climates have as uniform and powerful an influence over the animal as over the vegetable kingdom. Throughout extended districts of the United States, and especially on the borders of the desert areas, the lapse of a few generations has shown a marked change in the race from their European ancestors, in their thinner busts, smaller heads, slender and more elongated forms. Yet the full effects of climate cannot be wrought out till that roaming life so productive of a hardy race shall have been superceded by the peaceful pursuits of industry.

"Let any one," says a recent traveller, and we have often observed the same, "take his stand at any railway station in the west on the borders of Kansas [lat. 37° to 40°], and mark the robust full form and florid complexion of the Canadian going west, in contrast with the emaciated appearance of the inhabitant of the west going east," and ask himself what changes half a dozen generations even would produce upon the permanent inhabitants of those regions. The world over, on and around the desert areas of the earth, we have a peculiar type, of which the Bedouins of Arabia, the inhabitants of Palestine, Independent Tartary or Northern Africa, are the unvarying emblems. Their attenuated forms, their small and wiry limbs, seem made rather to move with the drifting sands than to perform the labours of industry. Without steady habits, they have no great manufactures or commerce, little accumulation of wealth, and, as a necessary consequence, no high civilization, but a semi-barbarism rather in all their ages of history,

and in all similar regions of the globe. One half the superficial area of the United States is a desert or semi-desert, and the whole too far south to make it permanently the seat of power or of empire on this Continent. That the south of North America was settled before the north, and is still the destination of most European emigrants, is what any one acquainted with history would have predicted.

Europe was first settled in the south; and even subsequently every swarm which went out from those overflowing northern hives turned their faces southward. But here in time, as in Europe, population, manufactures, commerce, wealth, high civilization and power, will be found in the north. Twenty-five thousand beef-eating Englishmen, of a younger civilization by many centuries, brought into subjection a hundred millions of rice-eating Hindoos. Power, the amount of life in the few, triumphed over the many. Military discipline and superior arms, it is true, gave Rome, a southern country, the ascendancy over Gaul, Germany and Britain; but eventually Rome conquered the north by northern men, and she herself in turn yielded to the north. The greater amount of life in the northern character is seen in their valour in war, in their energies in peace, in manufactures, in commerce, and in all the walks of life.

Harvey J. Philpot, M.D., Assistant Surgeon to Her Majesty's Forces in the Crimea and Turkey, says, in his "Guide Book to Canada" (London, 1871), p. 67:

"Canada is an exceptionally healthy country. I do not hesitate to make the statement after seven years in the country engaged in an extensive medical practice. As a race the Canadians are fine, tall, handsome, powerful men, well built, active, tough as pine knot, and bearded like pards. The good food upon which they have been brought up [with the invigorating climate], appears to develop them to the fullest proportions of the 'genus homo.'"

Marshall, in his recent work on Canada, says, "I am persuaded that, despite its severity, the climate of Canada is one of the healthiest in the world. It is expressly fitted to develop a hardy race. For the bringing up of a young family, it is to be preferred very decidedly to the climate of almost all the states of the Union south of the chain of Canadian lakes. The fact of the generally healthy condition of the people, the splendid development of the men, the preservation of the English type of beauty of the women, may be taken in proof of the excellence of the climate."—p. 237-8.

"The Canadian, whether English, Irish, or Scotch, is well proportioned and vigorous, often tall, with broad shoulders, sinewy frame, and capable of great endurance. He is quick of resource, enterprising, sober-minded, persistent and trustworthy. The races of the British Isles and of Norway have certainly not degenerated here."—p. 5.

"The American and Canadian peoples are fast becoming sundered by the development of distinct types of national character. Two races are here forming side by side. The Canadians are still strictly Anglo-Saxon [or Anglo-Norman]. In so far as the climate is changed at all, it is by a return to the severity of northern regions, from which the Scandinavian peoples came. *The old race bids fair to attain a new vigour.* The Canadians, as a rule, are hardy, well developed, fresh-coloured; they love the country and the life of a farmer [the Canadian farmer is mostly a land-owner, and not like a European farmer]; they are fond of field sports and of vigorous exercise; they are all born soldiers, and learn to handle the rifle well. They are like the English of past generations." "They are the most military people on the globe, with the doubtful exception of Prussia."

"The American people, though distinctly Teutonic, is ceasing to be Anglo-Saxon or English. It will soon become, if indeed it is not already, a nationality of more mingled elements than ever the world has known before. It is impossible to travel east and west without perceiving that changes from the old English type have taken place."

Some of the causes for such changes Mr. Marshall gives:—

"1. An enormous immigration of Irish, Germans, South Germans and Swedes has been attracted from the Old World. The English are lost in the multitude of other races.

"2. The new comers rear large families, of eight, twelve, sixteen children; the native American, the descendant of the English race, chooses to have but one or two.

"3. In estimating the growing divergence of type of the American and Canadian peoples, account should be taken of the difference of climate of the two countries.

"This difference, acting persistently as it does, and upon every individual of the masses, must exercise a great though insensible power in modifying the physique and the character. And, singularly enough, the operation of this cause appears to be directly in the line of those already indicated. Climatic influences tend to intensify the differences created by divergence of race.

"The Canadians are eminently English. They speak the language as we do, with no noticeable change of accent. They are jealous to a fault of the English honour, and proud of the English fame and power. In race they are wholly one with us. Climate has fostered, not changed, the national characteristics. They are conservative of the old traditions of English liberty, and honour, and national greatness. They are the English of the English."—p. 245–8.

"The type of beauty in Canada is particularly English. The women are well proportioned, well developed, often very fair, and sometimes stately and tall. There is a greater admixture of Scotch blood than is found in most parts of England proper. In the city of Toronto especially

I was struck with the large number of beautiful women with golden hair. I believe that this is due to the purely Saxon origin of many of the families settled there."—p. 284.

In his report on the Canadian Militia to the Dominion Government, in March, 1870, Col. P. Robertson-Ross, says—"The rural battalions are almost entirely composed of the agricultural population, the bone and sinew of the land, who have a stake in the country, and in many instances are the proprietors and sons of proprietors of the land; *and it is impossible to see a hardier race, or finer material for soldiers.* In many instances their physique is most remarkable, and they all appear imbued with a spirit of great loyalty to their Queen and country, and the same spirit and aptitude for military service are exhibited by the city battalions." (Quoted also by Marshall, p. 257).

"I attended," says Mr. Marshall, "a volunteer corps shooting match at Ottawa. I remarked particularly the splendid physique of the men. The stalwart farmers, backwoodsmen, and lumberers of the country would produce the finest army conceivable. 'Great heavens!' exclaimed an English officer at the sight of those tall, broad-shouldered, resolute-looking men, 'what superb fellows I would make of these, if I might only lick them into shape.'"—p. 258.

These are the opinions of well informed Englishmen, whose knowledge of the peoples in the several countries of whom they speak or write, should give weight to their views.

X. DESERT AREAS OF THE UNITED STATES.*

OUR comments here refer chiefly to the following points:—1st. *That the country west of the 98th meridian, within the United States, is mostly a desert, made such by the absence of summer rains.* Let the reader examine the map, and he will find that one half of the Republic lies west of the meridian of Minnesota. This is the region of summer droughts, four to five months—the agricultural months—without rain. Where there may be rain in summer, as on the eastern and north-eastern borders of this immense area, the evaporation is so great and the atmosphere so dry as to render it a very inferior agricultural country. These desert and semi-desert areas correspond in position on this continent with the deserts of the Old World, with this difference—the desert of Sahara being checked in its northern sweep by the Mediterranean Sea, the arid region does not rise so high in Europe as in America, which has no such water to the north; but east of the Mediterranean the desert

* From the advice of friends in whose judgment he has confidence the author has added this chapter, stating more fully the remarkable difference between the climates and capabilities of the soil over those vast territories in Canada and that part of the Republic lying west of the Mississippi. In reading it, reference should be made to the accompanying maps.

goes as high as in America. When we reach British America, north of 49°, we come to the region of summer rains—hence the vast districts there up to latitude 60° of the finest agricultural country, wheat maturing north of 60°, and barley to 65° and even to 67°.

Blodget (chapters 4 and 5) compares the deserts which lie between the Mississippi and Pacific with the deserts of Africa and Asia :—

" On both Continents a desert belt extends, in general terms, from the sea on the west, at 25° to 30° north latitude, north-eastward to the centre of the Continent or beyond."—p. 167.

The " centre of the Continent" between New York and San Francisco is about the meridian of the western boundary of Minnesota. Those at all acquainted with the climates and desert areas of the United States, know how applicable Blodget's statement is to the greater portion of the country west of the 98th meridian. The cactus and artemisia are emblematical of those deserts, the cactus covering the southern and the artemisia the northern part of this half of the Republic.

" The cactus is characteristic of the arid climates of North America," (p. 173). " There is another class of plants of universal range in the dry areas of North America, having equal rank with the cactus—the artemisia of the desert. This is almost universal over the districts of the arid interior,—it begins at the same line from the east, or at the 98th meridian, nearly occupying the *northern half* as exclusively as the cactus does that of the south ; its presence indicates a general *barrenness* for other vegetation and a deficiency of grass. On the *plains of the Upper Missouri*, this artemisia, or sage of the desert, is a leading and almost exclusive form of vegetation. Another large and elevated sage desert exists between the mountains and Snake River [in the much praised Walla Walla country]. A large portion of the great plain of Columbia is also occupied by the artemisia, (p. 174–5). The artemisia may take the place of the cactus in part from an adaptation to saline and alkaline soils."—p. 175. *

2nd. *The soils are so impregnated with salts and alkalies as to be destructive of vegetation except for the sage of the desert, an emblem of an arid sterile region.* " There are distinguishing conditions of soil and surface of the whole of the region of the basins and of a large share of the plains and mountains in the interior and Pacific divisions of the Continent. One of these is the great quantity of saline and alkaline elements in the soils of the surface, and this not only in the basins where they might be expected to exist, but in the *plains and mountain* slopes, which receive all the rain falling there :"

* " On the Missouri there is known to be a great deficiency of rain in the summer months at times, and a large part of the great area *partially* enclosed by its long curve [between the 97th and 110th meridians west and to the 48th parallel north] is set down as an arid and uncultivable district by explorers. Its amount of drainage is too small to permit the supposition that it is otherwise, as all the tributaries from the west and south below the Powder Horn River are small and comparatively unimportant streams."—Blodget, p. 333.

(p. 157.) This region "commences at the 98th meridian very nearly, the Salt Lake region near the Red River of the north being the first point at that latitude. From this point westward *along the Missouri, saline lakes and marshes and alkaline efflorescences* are frequent on the plains both *north and south*, particularly at the *Mauvaises terres*, or *bad lands*, which name is applied to many parts of the great area included by the northerly bend of the Missouri (lat. 48°), and extending nearly down to the Platte River (lat. 42°). The distinguishing plant of these soils is the artemisia. The immense area occupied by this family of plants from near the meridian of 100° *to the Pacific*, is noted as an impressive feature of its aspects by Fremont, Beckwith, and others who have traversed it."—p. 158.

Beckwith, speaking of the saline properties of the soil, which he states "are often seen efflorescing upon the surface," says:

"If science should develop the means of neutralizing their injurious effects, a material change of climate, providing a greatly increased quantity of aqueous vapour, would be required to bring any considerable extent of this arid region under cultivation."—Report, p. 89.

3rd. *The great variation in temperature, from* 80° *to* 90° *during the day, to the freezing point and even below it at night, is another characteristic of that country*

"The next peculiarity [of those regions] is the great range of temperature in the daily changes. The heat of mid-day may be at 75° to 80°, yet with the formation of ice, and a temperature of 30° or down to 24° at sunrise [eight degrees below the freezing point], and this is also general over this whole district. The altitude and arid surface both facilitate this daily variation." (Blodget, p. 159–60.) Lieut. Maury states that in August at the western border of the basin of the Columbia River, temperatures at noon were 90° to 98°, and at sunrise 33° to 39°. Beckwith found his thermometer at 87° to 92° at 3 p.m., and below the freezing point at night.—Report, p. 63.

In considering the climates of the interior of North America, it must be borne in mind that the Continent, which is nearly two miles high in Mexico, spreads out like a fan northward, retaining a high altitude through the United States, but falling to 800, 600, and even to 400 feet in British America; that one mile in height (5,280 feet) causes a fall of fifteen degrees in temperature. Hence the anomaly of a milder climate going north.

4th. *The soils of those regions under discussion, where not saline, are so sandy and friable as to prevent the cultivable grasses, and consequently the green pastures and meadows, from taking the place of the prairie grasses when these are ploughed up.*

The pastures and meadows, with their accompanying herds, flocks and dairy, have a value equal, if not superior, to the cereals. The prairie

grasses make good pastures in their wild state, and grow where cultivated grasses will not; but when the country is tilled and they are ploughed up, they cannot be re-set in districts even partially deprived of summer rains. Blodget says, (p. 451), "When the turf of the native species is broken up, it is then almost incapable of reproduction, as they (the wild grasses) rarely produce seed, and never spread from the root." "Even east of the Mississippi the climate limits them through high summer temperature and long droughts. West of the Mississippi (90th meridian) the climate is still less favourable, and as the *soil has less of the retentive character* in receding from the Mississippi, the favourite cultivated turf (or pastures and meadows) almost wholly fails."—p. 449.

The grasses, such as the timothy and clover, when grown from the seed, have such a slender hold of the soil, and are so feeble, during the first summer, that they are easily killed by a drought of two or three months, a not uncommon occurrence in the Western States even east of the Mississippi. Such droughts have, as far east as Ohio, destroyed the pastures, and more frequently in Illinois, Missouri, Kansas and Iowa. West of the Mississippi the absence of rain during from three to five months—the agricultural months—renders it impossible to have pastures and meadows of cultivated grasses; and these have an economic value above that of wheat even. The region of the cultivable grasses is the same as that of the summer rains, roughly sketched in the temperate zones of this Continent by the presence of forests. Where these do not exist, the cultivable turf cannot be produced unless in the higher latitudes with a more humid atmosphere. Hence the vast areas in the Western States, even east of the Mississippi, unfavourable for pastures, and of course for the dairy. Of most of the territory west of that river enough has been said to show that such pastures must almost totally fail. As a general rule, the cultivable grasses fail south of 39° or 40° east of the Mississippi and at a much higher latitude west of it. Over extended districts, in the latitudes of Washington and Baltimore, such grasses are killed both by the winter frosts and summer droughts. Hence, on account of the deficiency of hay in the Western and Southern States, Canada sends hay to Chicago and to the Gulf States, and still retains enough to feed her own immense herds through her winters; hence, also, the great numbers of horn-cattle, sheep and horses exported every year from the rich pastures of the Dominion to the States.

The peculiar climate of California—and we have the same in Australia and in other countries—requires a passing notice in this connection. "But California," it is often said, "is a good wheat country." So, also, I have seen Australian wheat superior in appearance, not in value, to our own. In such localities the wheat is sown in autumn and grows through their mild winters (the winter of San Francisco is 51° 5′, autumn, 60°, and spring, 57°), and "ripens in May." (Blodget, p. 188). But, there being little

or no rain in summer, such a climate is destructive of the grasses and vegetables, and such grains as, sown in spring, require the summer for their growth and maturity. In such countries the beginning of the heat and drought of summer is the end of vegetation. Besides, the climate of California is exceptional, from the body of cold water off her coast; the difference between winter and summer is less than nine degrees, and autumn is as warm as summer. Crops of even wheat—almost their only grain—in such climates are very precarious. Colton says, "Some of the largest crops have been gathered in California, and yet those very localities, owing to a slender fall of rain in winter, have next season disappointed the hopes of the cultivator." As we recede from the coast, the winters are too severe and the summers too dry for any such grain.

"The boundary between the regular summer rains in North America and the characteristic summer rains of the temperate latitudes, is the River Gila, between the Rio Grande and the Colorado" [lat. 34°].—Blodget, p. 331.

"The excess of summer temperature in the United States appears more decidedly peculiar, because of the contrast first and most readily drawn between this and the cool summers of Europe. Its proper comparison is with China. Pekin, at 40° N. lat., has a mean summer temperature of 76°, which is two or three degrees above that of Philadelphia, the latitude and position of which are the same. At Nangasaki, Japan, we find a mean of 80° for the summer, its position corresponding with that of Charleston, which has the same measure of heat for the summer. Canton and Key West again correspond, both being essentially tropic."—p. 127–8.

There is nothing "peculiar in the excess of summer temperature in the United States, in contrast with the cool summers of Europe," as Mr. Blodget states. That the northern limit of the States east of the lakes, except part of Maine, is south of Venice in Italy, and Bordeaux in the south-west of France, very plainly suggests the cause of this difference in summer temperatures. That part of the United States lying west of the lakes and north of 45° (Chicago is in 41° 52′) skirts the eastern and north-east borders of the Great American desert, off which the arid burning winds almost constantly blow over Kansas, Missouri, Iowa, Illinois, Minnesota, &c., parching the land and withering every green thing. Blodget informs us on the same page (128), that "the arid and extreme character of the plains sets in at the 100th meridian;" and in other places that the arid region begins at the 97th," (p. 158). Minnesota goes west of the 97th, and Iowa to it. Over the entire arid interior the absence of humidity in the atmosphere is another cause of the great heat of the sun.

"Fremont found artemisia or sage [an emblem of a rainless region in summer, and usually of saline and alkaline soils] at a point but little

beyond the 96th meridian on the Kansas, and from this meridian to the Rocky Mountains it constantly increased in abundance. Farther south, plains of salt and gypsum occur at about the 97th meridian, and near the Red River (lat. 31°) in Upper Texas, both become very abundant again, occupying most of the country. In Lower Texas, at the same meridian, they characterize the desert of the Nueces river—thus commencing with great regularity at nearly the same point of longitude for the whole distance, or for *nearly twenty-five degrees of latitude* [going beyond the southern boundary of Texas and into Mexico]. The cactus is a characteristic plant of the arid region, also. It begins still farther east, marking sandy localities, in some cases east of the Mississippi. But the larger forms of cactus, and the 'interminable sage desert,' have their home in the great interior plains and basins, and they are as decisive of climate in respect of humidity [that is, the absence of humidity] as the glittering efflorescences [saline and alkaline earths] which are so conspicuous a phenomenon there."—Blodget, p. 158-9.

These statements show that the region of summer droughts—the desert area—begins at the 97th meridian, a little west of the Mississippi, and extends from north to south over the whole territory of the United States, from the 49th parallel beyond the southern boundary of Texas. From this meridian, the 97th, this climatic defect—the want of rain in summer—diminishes eastward but increases westward, rendering more than half the area of the United States either altogether useless as an agricultural country, or very inferior to the country east and north of that region.

"The whole of the eastern slope of the Rocky Mountains is still generally arid, and the loose soil and rapid evaporation dissipate the rains and diminish the effect of the fall of any certain volume, much below that of a similar rain-fall on the retentive surface and soil eastward. On the upper plains of Texas, and over all the plains west of the 100th degree of longitude, irrigation is generally necessary to support cultivation which requires the summer for its growth, and in the valleys nearest the mountains in the west it becomes more decidedly so than elsewhere."—Blodget, p. 329-30.

Professor Joseph Henry, Secretary of the Smithsonian Institute, Washington, says of the desert areas:

"The whole extent of country to the west between the 98th meridian [Minnesota goes to the 97th, Kansas to the 102nd, and Dakota, Nebraska, Wyoming, Montana, Colorado, and the other territories, lie west of the 98th meridian] and the Rocky Mountains, called 'the great American plains,' is an *arid desert*, over which the eye may wander to the horizon without seeing anything to relieve its monotony. And perhaps we shall surprise the reader by drawing his attention to the fact that this line, which is drawn southward from Lake Winnipeg to the Gulf of Mexico,

divides the surface of the United States into two very nearly equal parts. When properly understood, this statement will serve to dissipate some of the dreams, regarded as realities, about the destiny of the western part of the Continent of North America ; but truth in the end takes precedence of praiseworthy patriotic sentiment."—Quoted by Mgr. Taché, Bishop of Boniface, in his " Sketch of the North-West of America," p. 11.

From the Mexican Boundary Survey, conducted from 1844 to 1855 by Major Emory, we may take the following, (see American Executive Documents, vol. xiv., 1855–6) :

" The term plains is applied to the extensive inclined surface reaching from the base of the Rocky Mountains to the shores of the Gulf of Mexico. Except on the borders of the streams, scarcely anything exists deserving the name of vegetation. The soil is composed of disintegrated rocks covered by loam an *inch or two in thickness*, composed of the exuviæ of animals and decayed vegetable matter.

" Whatever may be said to the contrary, these plains *west of the* 100*th meridian are wholly unsusceptible of sustaining an agricultural population until you reach sufficiently far south to encounter the rains from the tropics.* [The desert is checked on the south by the rains on the borders of Mexico, but not in the north within United States territories.] The precise limits of these rains I am not prepared to give (continues Emory), but think the Red River (of the south) is perhaps as far north as they extend." (Vol. i., p. 44.) The Red River enters the Mississippi at latitude 31°. West of this to the Pacific, Blodget (p. 331) says, " The table-land from the Rio Grande to the Colorado (emptying into the Gulf of California), along the Gila River, forms the boundary between the regular summer rains of northern Mexico and the characteristic summer rains of the temperate zones." So that these rainless regions are made to extend by these writers over nearly the whole of the United States west of the 100th meridian to the Pacific, for Blodget's tables give no rains in summer on even the Pacific coast, and he makes this rainless region begin on the 97th meridian, and extend from the northern limits of the United States south into Mexico.—(p. 158).

The United States embrace nearly the entire desert areas of North America, so merciful have they been to their northern and southern neighbours in drawing the boundary line.

" This region," I quote again from Emory, " is very arid, but this is also the character of *all the country north of the tropics and west of the* 100*th meridian* until you reach the last slope of the Pacific, a narrow belt seldom exceeding 200 miles in width, and sometimes not more than ten. [See tables for rain in summer, App. A, which give little or no rain in summer on the Pacific coast.] This region is narrower on this line of the [Mexican] boundary than in any portions of the Continent north. This region (on the south)

is occasionally refreshed by summer showers, and so far presents an advantage over the arid belt to the north."—p. 39.

XI. CLIMATOLOGICAL RANGE OF CEREALS, COARSER GRAINS, GRASSES, AND PLANTS OF TROPICAL AND SEMITROPICAL ORIGIN.

In the interior of the continent wheat matures north of latitude 60°, where the summer temperatures are at 60° Fahrenheit, with one month at 62° to 63°. On the Atlantic coast it would scarcely reach the 50th parallel; but on the Pacific the climates would justify the inference that it would ripen north of 60°, as in the north-west of Europe it is grown at 63°. Its southern limits cannot be so definitely defined, for it will ripen in Mexico (lat. 31°), but at an altitude of 2000 feet; along the Alleghanies, it goes south to Georgia, and in California, where the summers are about 60° and the winters 51°, the wheat sown in autumn, as in Australia, grows through the winter and ripens in May, before the heat and droughts of summer. These, however, are local and limited exceptions to the general rule. The southern limit of the profitable growth of this cereal may be placed at the summer isothermal of 70°, which, on the Atlantic, falls to the 40th parallel, including the Eastern States (where it is but little grown, not however from climatal causes) and the Middle States, with the high lands of the Alleghanies, and the Western States to latitude 39°; thence the line runs north-west to the 51st parallel on the 100th to 115th meridians, falling down the Pacific coast to latitude 46°.

The coarser grains and cultivable grasses have nearly the same southern limits. Northward, rye and oats go to 65°, barley to 67°, and the grasses to the Arctic Ocean. Maize, a tropical plant, ripens at latitude 54° on the Saskatchewan, throughout most of the valley of the St. Lawrence, even to 500 miles north of the southern limits of Canada in longitude 83°, as well as in New Brunswick, Nova Scotia and British Columbia.

The wheat zone covers in Canada about 1,300,000 square miles, the grasses and coarser grains at least 2,300,000, and maize half a million.

We need not here point out the positions at high altitudes and on heavy cold soils where these plants would fail. Such exceptional localities exist in all countries, and need no explanation to the intelligent reader.

In reference to cotton, sugar, and rice, plants of tropical origin, we make only a passing allusion, as they find their appropriate climates only south of the regions of the chief staples of the temperate zones. They are confined to the south-eastern parts of the United States, around the Gulf of Mexico, and along the Atlantic to latitude 35°, cotton growing on the Mississippi to the 40th parallel. The sugar cane comes to maturity in

eleven months where the mean temperature is 82°, in twelve months where it is 78°, and in fourteen months where such temperature remains at 74°.

Cultivated rice is also confined to narrow limits on the low lands of the coast; but wild rice is found over a vast extent of country, and to high latitudes. Requiring a somewhat high summer temperature, it may be taken as a very good guide to the climates favourable for the culture of the great staples of the temperate zones.

XII. GEOGRAPHICAL DISTRIBUTION OF PLANTS.

THE cone-bearing trees—pines, spruces, larches, &c., which find their most congenial climates in lower temperatures than the leaf-shedding or deciduous trees—may be found in a broad belt from about the 45th parallel on the Pacific, running northward, west of the mountains, and sweeping around the northern parts of the Continent, down Hudson Bay and the Atlantic coast, but keeping the higher latitudes in the interior. Plants and trees that require high temperatures and rains more or less copious during the summer, cover this interior area of the Continent far towards the north in the direction of the lines of equal summer heat. The trees of this great mixed forest are the maple, beach, elm, basswood (*linden*), oak, chestnut, cherry, butternut, walnut, hickory, iron wood, magnolia, birch, poplar, and many others: the last two go even higher north than the coniferæ. One species of the magnolia (*lireodendron tulipifera*) is found in Canada. The chief varieties of the coniferæ are also found amongst these great mixed forests, and in many places predominate; but it is a remarkable fact that in most localities where those trees are cut down, or, as in some cases, die or are burned, their places are taken by the deciduous trees.

Thus the native flora, or its absence in whole or in part, is the index of three distinct conditions of climate over extended areas. The deciduous trees occupy the interior parts of the Continent having high temperatures and uniform rains in summer; the coniferæ cover the coasts and high latitudes which have cooler summers, accompanied with rain and a humid atmosphere; the southern central portions of the Continent west of the Mississippi, between 30° and 50°, have high temperatures in the warmer months, but either with no rain or a deficiency; hence, they are destitute of either varieties of trees named above, but covered, when covered at all, by plants emblematical of an arid climate and saline soils.

XIII. COMPARISON OF INTERIOR AND OCEANIC CLIMATES.

ON western coasts temperatures differ less in summer and winter than on eastern coasts or over the interior. On eastern coasts, except in high and low latitudes, it is warmer in summer and colder in winter than on the western. The interior has warmer summers and

colder winters than oceanic climates. The summer of the south-west of England (lat. 50°) is 60° 9′ and the winter 44° 2′; Swansea, (lat. 51° 36′) has 62° 5′ in summer, and 40° 6′ in winter; Glasgow, 60° 1 in summer, and 39° 5′ in winter; Astoria on the Pacific (lat. 46° 11′), 61° 6′ in summer, and 42° 4′ in winter; Sitka (lat. 57° 3′), 57° 5′ in summer (Aug. 59°), and 36° 5 in winter. In the interior we have, at Quebec, summers of 69° 1′, and winters of 13° 33′; at Cumberland House (lat. 53° 57′), summers of 60°, and winters of 1° 10′; at Fort Simpson (lat. 61° 51′), summers of 59° 5′ (July, 63° 6′) and winters of 10° below zero; at Yuken (lat. 66°) a summer of 59° 7′ (July 65° 7′), and a winter 23° below zero. On the eastern coast we have, at Halifax, 60° 8′ in summer, and 24° 7′ in winter; Okak, Labrador (57° 30′), 49° 5′ in summer, and 4° 2′ in winter.

Above the parallel of 50° there is more rain on western coasts than on eastern, and more on the coasts than over the interior. In the central parts of the Continent west of the Mississippi, there is but little rain in summer between 30° and 50°; north of this is the region of summer rains. On the western coast south of 46°, there is little or no rain in summer, but abundance on the eastern. Over the arid interior, where there is no rain in summer there are usually heavy falls of snow in winter; but north of 50° the snows are light. On the eastern Continent we have similar climates, both as to temperature and rain, modified by physical causes, as mountains, high plateaus, vast extent of country unbroken by seas, &c.

XIV. CAUSES OF THE INTERIOR ARID AREAS OF THE TWO CONTINENTS.

The attempts to account for the deserts of the Old and New Worlds by the physical configuration of the Continents, have led to many ingenious theories. The chief of these is the assumption that mountain chains to the west of those rainless regions condense the vapour brought in the south-west winds, causing heavy rains on the western sides of the mountains, but leaving the winds without vapour east of those mountain chains. The phenomena of rain on the west but none on the east of the Ghauts in Hindostan and other places, have been taken as sufficient bases for this theory.

That those regions having no summer rains are on similar parts of the Continents north and south of the equator, both in the eastern and western hemispheres, beginning on western coasts at about the same latitudes; that there are no mountains west of the Desert of Sahara, and the rainless regions in Australia; that the entire coasts of Mexico, old and new California, west of the mountains, are quite as destitute of rain in summer as the regions east; that those west winds give heavy falls of rain to the north and north-east throughout Canada, and in autumn, winter, and

early spring, deposit heavy rain and snow on those interior desert areas east of the Rocky Mountains, over which they are said to pass in summer devoid of vapour;—these and other facts ought to have corrected the erroneous opinions on this subject.

Having elsewhere discussed this subject, we give here the briefest statement of what we believe to be the cause of those parts of the earth being rainless in summer only, but not, except in certain cases, without rain or snow at other periods of the year.

That the great south-west currents of air—the tropical currents—which over those latitudes are upper currents, bring the vapour which falls in rain and snow, is here assumed as admitted, for it is the basis of the theory which we are controverting.

Those vast wastes are, at the season of the year when little or no rain falls, highly heated by the summer suns. The south-west winds passing over these, become rarified, and thus, being capable of sustaining even more vapour than at a lower temperature, retain the humidity with which they have come from the tropics so heavily charged, till they reach the cooler regions, north and north-east, where they are condensed into rain or snow. Hence in summer the line dividing the zones of rain from those of drought is farther to the north-east; as autumn and winter approach, those highly heated plains gradually cool sufficiently to condense the vapours in the south-west winds, which now give heavy depositions of rain and snow.

XV. CANADA—GEOGRAPHICAL, AGRICULTURAL AND MINERALOGICAL.

In running the eye over a map of North America, the most natural divisions suggested of the Continent are into the oceanic and interior regions—the former embracing the maritime states and provinces of the Atlantic and Pacific coasts.

The interior division covers the entire area between the Rocky Mountains and the Alleghanies—the Mississippi, with its tributaries, forming the southern portion of this interior valley, and lying chiefly within the United States, and mostly south of the zones of the grains and cultivable grasses.

The northern division, which we have to consider, is bounded on the west by the Rocky Mountains, on the north by the Arctic Ocean, on the east by the Atlantic, and on the south by the United States. There are four great river systems in this immense region: 1st, That of the St. Lawrence; 2nd, Lake Winnipeg, with the streams which find an outlet through it—the Saskatchewan, Assiniboine, Red, Winnipeg and Nelson (the outlet); 3rd, Mackenzie River; 4th, Hudson Bay.

Each of these valleys embraces in round numbers about half a million square miles, and the Pacific slope quarter of a million. The streams on

the Atlantic and Pacific will readily be seen by reference to any good map of North America.

The Rocky Mountains are the water-shed of the great rivers of the northern interior region and the Pacific slope. The Laurentian chain, extending from Labrador to high up west of Hudson Bay, divides the waters falling into the St. Lawrence from those flowing northwards into that bay. Between Brockville and Kingston a spur of these mountains is projected across the St. Lawrence, forming the Thousand Islands, and spreading out, in the State of New York, into the Aderondack Hills. These Laurentian mountains consist, in the opinion of geologists, of the oldest known rock formation on the globe. On the south of the lower St. Lawrence are the Shickshock or Notre-Dame Mountains, stretching from the 45th parallel to the gulf; south-east of Montreal, and at fifty miles distance, they enter Vermont, forming the Green Mountains.

The great basin of the St. Lawrence, according to Sir Wm. Logan's Geological Reports, has an area of 530,000 square miles. Of this, 70,000 belong to the United States; but including Newfoundland, Prince Edward Island, Anticosti, &c., there would still remain some 500,000 square miles in Canada. As a valuable part of the Dominion, too, economically, we must include the fishing grounds in the gulf, around the shores of the maritime provinces and islands, and over the great and innumerable small lakes and rivers of the interior.

These lakes are situated on four plains, rising, one above the other, from Lake Ontario, which is 232 feet above the sea, to Lake Superior, 600 feet above that level. The beds of these lakes form the most remarkable depressions on the continent. Lake Ontario, having an average depth of 600 feet, gives a basin of 368 feet below the level of the sea, and some parts of it 1,500 feet. Lakes Superior and Michigan, if not Huron also, are 900 to 1,000 feet deep, the beds of which would be some 400 feet below the surface of the ocean.

One remarkable peculiarity of these lakes is the transparency of their waters. It is not uncommon for a voyageur to see the bottom to the depth of 50 feet, and [illegible] much on Lake Superior say to the depth of 200 feet.

The St. Lawrence and its lakes are estimated to contain 12,000 cubic miles of water, or more than half the fresh water on the globe. This is exclusive of the rivers and lakes of the north-west, some of which—both lakes and rivers—are in extent, although not in volume of water, equal to the St. Lawrence and its lakes. These vast bodies of water have a great and beneficial influence in tempering the heat of summer and the cold of winter. Their waters are remarkably pure and wholesome, being every where used for drinking, as also for culinary purposes.

In examining any good map of North America, the observer will be struck with the thousands of lakes in Canada, and their almost entire

absence in the United States, except in the northern part and that connected with the St. Lawrence. West of the Mississippi, especially through all the central parts of the Continent, there are no fresh water lakes during the summer; while in Canada, from the Atlantic to the Pacific, they are everywhere met with, beautifying the scenery, supplying wholesome water, and abounding in excellent fish.

The volume of water in the lakes and rivers of a country is a somewhat accurate measure of the rain-fall over the evaporation. The great desert of Sahara is almost entirely without rivers and lakes, and is also called the "riverless region." In the deserts and in the districts of summer droughts, within the United States, the rivers, in summer, are dry or very low, and the few lakes mostly salt. In such regions the evaporation in summer exceeds the rain-fall.

This contrast is attributable to causes favourable to the health and agricultural capabilities of the northern country; these are, the greater and more uniform fall of summer rain, and the more moderate summer temperatures.

These lakes and rivers add greatly to the salubrity of the climate, the cool, humid breezes from which modify temper the heat of summer; and the larger ones never freezing, soften the severity of winter. Nor should we be insensible to the great beauty of landscape from these numerous lakes and rivers of pure clear water. No country presents a greater variety of lovely and magnificent scenery than this land of a thousand lakes.

The numerous lakes and rivers in Canada are the expression, the index, of the surplus of the rain-fall over the evaporation. Even east of the Mississippi, in the latitude of Baltimore and Washington, where the rain is 10 to 13 inches in summer, the evaporation is so great, twice the amount of rain, that the smaller streams and springs fail; but in the more moist cool atmosphere north of the St. Lawrence, the water remaining in the ground from the melting of the snows in spring, with the summer rains, supplies moisture to the roots of plants and trees, while at the same season of the year the ground is dry and parched in the countries just named.

The position of the valley of the St. Lawrence is most favourable for the great staples of the temperate zone. It lies in the chief region of the grains and grasses—the region of summer rains and moderate summer temperatures. It is, too, but little elevated above the level of the sea, the tide rising at Three Rivers, 90 miles West of Quebec, and 600 miles from the sea. Lake Ontario, the head of which is more than 1000 miles from the ocean, has an altitude of but 232 feet, making a difference of less than one degree of Fahrenheit; and Lake Superior, 2000 miles inland, is but 600 feet above the sea level.

The Canadian part of the valley of the St. Lawrence lies between latitude 42° and 52°, and is celebrated for the splendid crops of wheat, barley, oats, peas, rye, roots, fruit, and the luxuriant grasses and meadows.

We give a few facts, taken at random, from the eastern, central and western portions of this great valley.

Professor Johnson, honorary member of the Agricultural Society of England, and well known as an authority on agricultural matters, in his Report on New Brunswick, gives us this table of averages :—

	New Brunswick.	New York.	Ohio.
Wheat per acre	20 bushels.	14 bushels.	15 bushels.
Barley "	29 "	16 "	24 "
Oats "	34 "	26 "	33 "
Indian Corn "	41 "	25 "	41 "
Potatoes "	226 "	90 "	69 "
Turnips "	460 "	88	

The central and western parts of the great valley of the St. Lawrence give a similar superiority in the staples of the middle and higher temperate zone, over the United States.

In some of the chief wheat-producing districts in Canada, this cereal has been grown for twenty successive years on the same land; the first crops yielding an average of forty bushels per acre; on new land fifty bushels is not uncommon. The average now--twenty-two bushels in some counties and twelve in others—does not give the capabilities of the soil. But this apparently "stupid husbandry" does not arise so much from ignorance as from necessity—wheat being the only marketable product in remote districts.

Beyond this valley and throughout vast areas of the north-west, the grains and grasses still hold their superiority over the south. Minnesota, the only state bordering on 49°, is confessedly the first in the Union in wheat, yet the statistics give this result :—

Red River	Spring	wheat,	40	bushels	per acre.
Minnesota.....	"	"	20	"	"
Wisconsin	"	"	14	"	"
Pennsylvania	"	"	15	"	"
Ohio	"	"	15	"	"

The variety and extent of the mineral resources of Canada are so great that to give anything like a full description of them would be quite inconsistent with our purpose. The beautiful maps of Sir William Logan give the outlines of the geological features, and the reports furnish descriptions of some of the economic materials with which Canada abounds. Large deposits of coal are found in the Atlantic and Pacific Provinces, and

also over extensive areas in the North-West Territories. Throughout Canada proper, to which chiefly the geological survey has been confined, the Laurentian, Silurian and Devonian formations prevail; but on the south of the St. Lawrence, in Nova Scotia, New Brunswick, and Prince Edward Island, and west of Lake Winnipeg, and again on the Pacific coast, the carboniferous appear.

The chief minerals of economic importance found in the reports are classed as follows:—

1. *Metals and their Ores.*—Iron bog ore; red hematite; magnetic ore; ilmenite or titaniferous ore; lead; copper, sulphurets and native; nickel and cobalt; silver; gold; platinum and iridosmine.

2. *Minerals applicable to chemical manufactures.*— Chromic iron; molybdenite; cobaltiferous iron pyrites; dolomite; magnesite; petroleum; bituminous shale; phosphate of lime.

3. *Refracting materials.*—Soapstone or steatite; potstone or chlorite; mica rock; crystals of mica; plumbago (graphite); asbestus or amianthus; friable sandstone; fire clay.

4. *Minerals applicable to construction.*—Limestone; dolomites; sandstones; Labradorite; gneiss; syenite; granite; marbles (found in many places and in great variety—white, black, red, veined with white, dark and light green, brown, brownish black, grey, &c., &c.); serpentines; roofing slates; flagstones; hydraulic cement; lime; brick clays; drain tiles.

5. *Grinding and polishing minerals.*—Whetstones; hones; grindstones: millstones.

6. *Mineral manures.*—Gypsum; marls; calcareous tufa.

7. *Mineral paints.*—Iron ochres; sulphate of barytes.

8 and 9. *Minerals applicable to the fine arts and to ornament.*—Lithographic stones; agates; Labradorite; albite (peristerite); orthoclase (perthite); jasper conglomerate; epidosite.

10. *Miscellaneous minerals.*—Feldspar; sandstone for glass; moulding sand; peat.

Petroleum or rock oil in large quantities.

Salt, recently discovered near Goderich, and very successfully manufactured. Supposed to be in inexhaustible quantities.

XVI. POPULATION.

The population of Canada is now (1872) about 4,000,000; we include in this estimate all British America. In Appendix B. we have given the numbers at different periods since 1760. Previously to 1850 the figures, although approximations only, are near the true ones. By 1875 it should be more than 5,000,000 at the rate of increase since 1840. By reference to Appendix B. it will be found that the population of the United States has

doubled every twenty-five years since 1775. This, considering the enormous immigration, shows a small natural increase, as the population of the British Islands, including those who emigrate and their descendants, doubles, from births alone, in that time. From 1850 to 1870 the rate has been much less (about 82 per cent. for 25 years), but was enough from 1825 to 1850 to make up the deficiency.

Turning to Canadian statistics (App. B , we find the increase about one-third more. In these comparisons we have included, from the first, the Maritime Provinces. It must be remembered that the United States embraced in 1775 only the 13 States on the Atlantic coast; in 1803 they bought Louisiana from France, and, in 1820, Florida from Spain, and from 1835 to 1850, added, of Mexican territory, Texas and California, with immense regions intervening, and got from Canada part of Maine and vast territories to the west of the Lakes. It was during this period that their increase was greatest. If we begin with Canada proper in 1800, and add, after the example of the United States, the other Provinces as they have been incorporated, the comparison will be much more in our favour. From 1800 to 1825, the increase would be 303 per cent.; from 1825–1850, 191 per cent., and from 1850–1875, 204 per cent.—the same rate being assumed as during the previous ten years.

We do not, of course, overlook the objection suggested to the mind of the statist, that the absolute increase in Canada has been small in comparison with that in the States, and that the higher percentage is due, it may be urged, to the small number upon which it is based. We would state in reply—1st, That the natural increase, it may be assumed, will keep pace with the population; 2nd, That one chief cause limiting the emigration from Great Britain and Germany (within given numbers, of course) has been the ability of new countries to absorb and give employment to the new comers, and that this ability increases faster than the population; 3rd, That the United States (with the exception of the one decade stated) have as high a percentage of increase upon a large as they had upon a small population, and, upon the principle just stated (No. 2), have given employment every decade to enormously increased numbers of immigrants. In the ten years ending 1860, they received nearly 3,000,000 immigrants; the previous ten years, less than 1,500,000; and the ten preceding, only half a million; thus, while their population increased only 32 to 35 per cent. in each succeeding ten years, the immigrants increased from 100 to 300 per cent.

The elements of increase in our favour in the future will be, 1st, The Republic is not likely to add any more foreign territory, and by this means swell her numbers; 2nd, The United States having reached the Western limits of arable lands, immigration, an agency so efficient in their increase in wealth and population, must now turn more towards Canada; 3rd, The

natural increase, upon which the Republic must hereafter chiefly depend, is much greater (about double) in Canada. Deducting the immigration* into the States from 1860 to 1870, the increase (by births) would be only about eleven per cent.

In 1800, the population of Canada was, compared with the States, as one to thirty-five, and including all the Provinces, as one to fifteen nearly; in 1870, as one to ten. From the circumstances in our favour referred to above, the attractions presented in our new territories, and the public works which must be undertaken, we may confidently rely upon an increase in our population in the future, unparalled in our past history. During the last ten years we see a diminution in the population of New Hampshire and Maine, and the whole of New England nearly at a standstill. The increase, 7,091,000, between 1860 and 1870, is 1,094,000 less than between 1850 and 1860, and only 904,000 more than from 1840 to 1850. The smaller increase shown by the last decennial census cannot be attributed so much to the war as to the causes referred to above.

XVII. FISHERIES.

Our fisheries, ocean and inland, are of inestimable value, both as a source of wealth and as nurseries for seamen. The chief of these on the coasts of North America are in Canadian waters; those off the coasts of the United States, being in warmer waters, are of much less value. From the banks of Newfoundland and the Atlantic Provinces, over the Gulf of the St. Lawrence, along the coasts of Labrador and Hudson Bay, around the shores of the three great oceans down to Vancouver, through innumerable straits, seas and inlets, thickly studded with islands and archipelagos on the grandest scale, we possess eleven thousand miles of sea coast, swarming with the most prolific fisheries. The Minister of Marine, in his last Report, makes their value some $17,000,000 a year, even in their present state, with all the carelessness and waste incident to an undeveloped industry of such vast extent, surrounded with so many elements of confusion.

But we have not yet availed ourselves of a third of them. At the mouth of Mackenzie's River, and at the 70th degree of north latitude, the Americans stated, many years ago, that they had taken in one season

* The Bureau of Statistics (Washington) values every immigrant at $800 to $1,200; this would add $350,000,000 to the wealth of the Republic in 1869 from this valuation alone—not including the money brought by each immigrant—and $8,000,000,000 (eight thousand millions of dollars) in the last fifty years, during which there have been 8,000,000 of immigrants to the United States. This sum equals half the value of all the real estate in the Republic in 1860, as given in the census. The money and material brought by the immigrants, the sums invested by foreigners in various ways, the money borrowed by States, companies, &c., make, by a careful computation, another eight thousand millions and more, taken chiefly from England, and added to the wealth of the Republic since 1820.

$8,000,000 to $10,000,000 worth of fish. When Hudson Bay, the Arctic and Pacific fisheries, rich as those of the Atlantic, are reached, we may value them at fifty millions annually. Then their importance as nurseries for seamen is beyond all price. Already we have 80,000 hardy mariners on our waters. To Britain they are of even greater value than to us, for she makes all her calculations upon being able to keep command of the sea.

Our inland fisheries, too, are of great value. Apart from the lakes on our southern boundary, in which the chief fishing grounds are in our waters, we possess nearly all the lakes on the continent (excepting those bordering and south of Lakes Superior and Ontario), and innumerable rivers swarming with excellent fish.

Being now the third amongst the nations in the tonnage of our shipping, and nearly equal with the United States, with these fisheries protected, we would soon rank as the second maritime power, and with the same percentage of seamen as now, we would, with a population of ten millions, have 200,000 mariners.

By the treaty of 1818, the United States have the right to take fish on some 380 miles of the south and west coasts of Newfoundland, from the Rameau Islands on the south to Quirpon Islands on the north, on the shores of the Magdalen Islands (in the Gulf of St. Lawrence), which have 100 geographical miles of coast, and indefinitely along the shores of Labrador.* But the treaty gave them no such rights in Canada, Nova Scotia, New Brunswick, Cape Breton, or Prince Edward Island. The cession to the United States, of the right to fish on these coasts also, is made in the Treaty of Washington, July 1871, not yet ratified. This treaty allows Canadians, down to latitude 39° on the coast of the United States, the same rights as Canada grants to the fishermen of the States; and to compensate us for the superiority of the privileges ceded, commissioners are to be appointed to award us what they may estimate the amount of the difference.

XVIII. MEANS OF TRANSIT—CANALS AND RAILWAYS.

From Belle Isle, an outer island in the mouth of the St. Lawrence, in longitude 55° 30′ (west from London) and latitude 52°, to the head of Lake Superior (long. 92° and lat. 47°), a distance of 2,400 miles, there are but 72 miles of canal. From Belle Isle to Montreal there is river navigation of 700 miles for the largest ocean steamers.

The railways of Canada are some 3,150 miles in length, and cost $160,471,000. Those under contract (of which the Intercolonial, 560 miles long, is the chief) swell this sum to $200,000,000 invested in rail-

* For the surrender of these, of almost priceless value, we have absolutely no compensation.

ways. Of this the Government have advanced $21,000,000, not including the Intercolonial.

The much talked of Pacific Railway would be less than 2,000 miles from the head of Lake Superior to Vancouver. Its advantages over any route through United States territories would be, 1st, a shorter line; 2nd, a fertile country in contrast with a desert south of 49°; 3rd, less snows; 4th, a level country; 5th, less grade, with 1,500 to 2,000 feet lower passage through the Rocky Mountains; 6th, coal along the line, and at Vancouver; 7th, and, when desired, 2,000 miles of navigation to Lake Superior.

The estimated distance from Liverpool through Canada to Vancouver is 5,749 miles, and *via* New York to San Francisco, 6,280, or, from England to the Pacific, 531 miles in favour of the Canadian route.

The construction of a railway to the Pacific is one of the conditions on which British Columbia has been admitted into the Dominion. Twenty miles of land on each side of the line may be set apart for such road, the Government retaining every alternate section.

In the length of railways Canada stands tenth amongst the nations, and nearly equal with Austria, Spain, and Italy, and seventh in the length of telegraph wire, having three times more than Bavaria or Belgium, countries with about the same population as Canada.

XIX. SHIPPING, TRADE, AND BANKS.

In the tonnage of shipping Canada* is third amongst the nations. At so early a period in our history, it promises well for our future that we have outstripped in this all the renowned, ancient, and powerful countries of Europe, except Great Britain. The two chief lines of ocean steamers—the Cunard and Allan—are of Canadian origin. The "Allan Line" numbers twenty-two steamers—one of 4,200 tons, others 3,600, 3,400, 3,250 3,000, &c. They have 79,251 tons in their ocean lines; of these, 53,234 tons are steamers, and 26,017 tons sailing vessels.

The two splendid lines of steamers on Lake Ontario and the St. Lawrence above (and all those below) Montreal, are Canadian, while the Republic, so much lauded at our expense, has no passenger steamers below Lake Erie, and no ocean line between Europe and America.

The trade returns for the year ending 30th June, 1870, show $148,387,829 worth, imports and exports. Adding *pro rata* the trade for British Columbia, the Hudson Bay territories, Newfoundland and Prince Edward Island, the imports and exports of the Dominion would be about $170,000,000.

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* Great Britain has 5,627,500 tons, the United States (English measurement), 1,579,694. Canada, 1,029,764.—See App. C.

The total liabilities of the banks are $82,202,672 ; assets $129,658,517
The paid-up capital and deposits in the chartered Banks were—

	Capital.	Deposits.
1862	$26,060,062	$18,644,557
1871	36,415,210	55,763,066
Additional deposits to the end of 1871....		2,126,819
Deposits in Savings Banks		10,500,000
Total deposits		$68,439,885

which equal within less than $10,000,000 the entire debt of Canada.

XX. MILITARY POSITION.

THE position of Canada for defence is the strongest possible. With her north inaccessible, her east and west resting upon the Atlantic and Pacific, Labrador on her left and the Mountains of Columbia—the coast range, the Blue and Rocky Mountains—on her right, she never could be approached, by the most powerful nations, except from the south ; and here she has fastnesses more inaccessible than Scythian in her Ottawas, St. Maurices and Lake regions. Even admitting that these, defended by a hardy population, could be overcome during the summer, the winter frosts and snows would force back the enemy and limit the invasion to half the year. When our interior shall have been settled, the country, from its very extent, would defy conquest.

Let the reader run his eye over the map of the world, and he will see that there is no country so impenetrable and invulnerable as Canada. Every nation of Europe and Asia has, in turn, been overrun—the enemy meeting few obstacles but opposing armies; a Northern army marched through the Southern States ; a Southern army penetrated the north, and was checked only by superior force. Russia is the only country at all resembling Canada in the strength of its natural defences ; but European Russia is a vast plain, and Napoleon laid it waste, against the whole force of the empire, for 700 miles from its western frontier to the ancient capital. Winter, however, did for the Russians what their armies could not do. Canada, in addition to winters of Russian severity, is everywhere studded with barriers to an invading army, and with the strongest strategic positions for defence.

CONCLUSION.

THE opinions and sentiments of the people of Canada are quite as much misunderstood by foreigners, and by many Englishmen, as her climates. The voluntary annexation of this country to the United States is assumed by many as certain, by others as probable, but by Canadians as impossible. No example can be referred to in history of four millions, or even one million, of people, voluntarily taking down the flag which their fathers had honoured for a thousand years and hoisting that of another country, and especially one which had been to

them an emblem of hostility, but never of alliance. Canadians are of all people the least likely to be the first example of such change of allegiance. To show the deep and active sentiment of loyalty to their own country and to the Crown, we have only to refer to four decisive epochs in Canadian history—1775, 1812, 1837, and 1861. At each of these successive periods a new generation had come upon the scene, yet the same earnest, deep, genuine devotion, was shown to their country and to the Throne. From what, then, do foreigners draw the opinion that Canada will ever seek a closer political union with the Republic? Canadians know that their danger will come, as in 1812, when every soldier and sabre, every ship and sailor of Britain were absorbed by that all-devouring war with Napoleon, and that their union with the rest of the Empire imposes upon them the duty of defending themselves, with the possibility of their own country being the battle-field; but these, Canadian rather than Imperial alternatives, Canadians have well weighed and accepted.

From the beginning there has not been any probability, not the remotest, of the union of these two branches of the Anglo-Saxon and Anglo-Norman families. The divergence becomes more marked every generation; and from these two centres of civilization on this continent, two distinct peoples, under independent governments, may now be more confidently predicted than at any period during the two and a half centuries of their separate existence. By showing the stability of our institutions, as proved by our entire history, we shall draw thither population and capital—the two great wants of a new country; for men of wealth, of enterprise, and the lovers of order, seek a country in whose stability they have confidence, while they shun one where great national changes threaten the public peace. Small, weak and divided communities are, at the present day, a prey to the powerful, as in the era of the great monarchies of antiquity. It is an age of great armies and mighty fleets, and our only safety will be in our ability to defend ourselves—in union, in consolidation, in training the youth of the land for the most efficient discharge of the duties required in peace and war. It should be our aim to seek for sounder relations with the parent State as alike our own interest and that of the great Empire with which it is our honour to be connected; an Empire, too, which has been the model of parliamentary government, whose precedent is most likely to lead us to that complete protection to life and property, without which government is a delusion, with that ample personal liberty, which will prove the best security against the anarchy existing over so large a part of this continent; for anarchy, under the name of liberty, is the curse of the New World. The central arm of the body politic must be strengthened. Our nationality, which is now only a sentiment, must be made a living and progressive nationality by the union of its elements, giving to every member of the community a personal liberty limited only by the obedience that must be paid to authority.

ENDIX A.

Places.	TEMPERATURE.									RAIN-FALL IN INCHES.					
	Lat.	Long.	Alt.	July.	Spring	Sum.	Aut.	W'ter.	Jan.	Spring	Sum.	Aut.	Year.		Snow.
	° ′	° ′	Feet.	° ′	° ′	° ′	° ′	° ′	° ′						
London, Eng.	51.29	.....	50	62.4	47.6	61.0	50.7	39.2	....	4.00	6.00	6.15	20.69	.....	....
Liverpool	53.25	2.59	50	58.6	46.2	57.6	49.1	40.5	....	6.19	9.78	10.81	34.10	.....	....
Glasgow	55.05	4.14	..	61.2	45.9	60.1	49.0	39.6	....	3.80	6.39	5.82	21 33	.....	....
Edinburgh	55.57	3.11	220	58.7	45.0	57.1	47.9	38.4	....	5.40	7.10	8.90	28.08	.....	....
Montreal	45.31	73.34	60	73 1	43.7	70.8	46.9	17.2	15.0	11.54	11.88	16.60	47.28	.....	67.0
Quebec	46.49	71.16	100	71.3	40.4	69.1	45.2	12.8	11.0	5.81	8.72	8.23	33.00	.....	....
Halifax	44.39	63.37	20	62.0	39.3	60.8	48.3	24.7	22.6	8.61	9.41	13.78	48.96	.....	....
Fredericton, N. B.	46.03	66.08	..	65.5	40 0	64.6	46.7	18.2	17.0	....	....	....	....	.....	....
Toronto	43 39	79.21	341	66.8	41 1	67.8	46.6	24.5	24.3	7.16	9 57	10 33	31 35	.....	72.9
Ancaster, near head L. Ont.	43.15	80.10	800	68.5	43.7	65.1	47.4	25.9	26.2	7.20	10.00	10.50	35 60	.....	90.0
Niagara	43.18	79.08	250	70.0	44.83	68.41	50 59	27.81	27.0	8.00	9.81	10.40	34.70	.....	68.0
Penetanguishene	44.48	80.40	626	70.4	39 2	68.0	45 2	21.7	21.4	8.40	9.50	10.60	36.00	.....	70.0
Temiscaming	47.19	79.31	630	67.3	37.6	65.2	40.1	15.0	9.2	8.30	9.20	10.80	35.50	.....	52.0
Fort William, Thunder Bay	48.23	89.22	660	62.2	34.3	59.9	37.8	10.7	5.7	9.00	8.30	10.60	34 40	.....	50.0
Lake Winnepeg	50.45	97.09	624	71.16	35.79	67.76	40.88	6.85	10.55	11.61	30.05	8.25	52.25	.....	39.5
Cumberland House, Saskatchewan	53.57	102.20	900	61.8(?)	32.5	60.0	32.7	1.10	-7.0	....	....	....	....	.....	39.0
Lake Athabaska	58.43	111.48	700	63.0	22.8	58.7	31.9	-3.3	-8.7	....	....	....	....	.....	36.0
Fort Simpson, Mackenzie River	61.51	121.57	400	63.6	26 7	59.5	27.3	-10.0	-12.5	....	....	....	....	.....	36.0
Yukon, N. W. America	66 00	147.00	200(?)	65.7	14.3	59.7	17.4	-23.9	-26.8	....	....	....	....	.....	50.0
Sitka	57.00	135.18	50	58.5	40.5	57.5	47.0	36.5	35.7	18.32	15.75	32.10	89.90(?)	.....	50.0(?)
Vancouver	49.00	124.00	60	62.5	49.0	61.5	50.8	37.0	36.0	15.(?)	12.00	24.(?)	60.(?)	.....	....
San Francisco	37.48	122.20	50	59.8	57.0	60.1	60.1	51.5	50.1	7.56	0.09	2 96	21.95	.....	....
St. Petersburg	59.56	30.19	..	62.7	35.9	60.6	40.3	18 1	15.7	2.89	6.73	5.11	7.65	.....	60 0
Berlin, (Prus.)	52.45	13 24	115	65.8	47.4	64.5	49.2	31.4	27.7	5.66	7.21	5.45	13.56	.....	....
Rome	41.54	.....	170	76.0	57 2	74.2	62.7	46 7	60.5	7.27	3.39	10.89	20.86	.....	....
Paris	48.50	2.20	120	65.6	50.6	64.5	52.2	37.8	35.4	5.53	5 92	6.51	22.64	.....	....
Naples, (Italy)	40.52	.....	150	76.1	57.5	74.4	61.4	47.6	60 3	7.24	2.93	10.52	39.64	.....	....
Dijon, (E. France)	47.19	5.00	746	70 2	53.3	69.6	53.3	35.4	33.6	7.07	7.49	9 27	21.15	.....	....
Catania, (Sicily)	37.50	.....	50	....	....	....	....	....	....	7.29	0.63	10.46	28.13	.....	....
Bordeaux, S. W. France	44.50	00.34	50	73.1	56.1	71.1	57.9	43.1	41.0	7.20	7.39	10.34	34.00	.....	....
Algiers	.....	.....	..	....	....	....	....	....	....	....	0.60	....	2. ..	.....	....
San Louis Rey, (Cal.)	33.13	117.25	20	70.60	....	72.5	65.8	51.1	....	0.21	0.00	3.48	33.95	.....	....
Fort Yuma, (Cal.)	32.43	114.36	120	92.3	72.1	90.0	75 7	56.8	73.6	0.27	1.30	0.86	6.15	.....	....
Fort Reading, (Cal.)	40.30	122.05	400	82.9	59.9	80.0	62.3	46.1	62 1	1.30	0.29	4.89	29.02	.....	....
Dallas of Columbia, (Oregon)	45.36	120.55	350	73.2	53.6	70.0	52.2	35.6	52.8	12 63	0 42	3.78	13 81	.....	....
Socorro, (N. Mex.)	34.10	107.(?)	4,560	....	....	....	....	....	....	1.10	2.23	3.39	17.86	.....	....
El. Pasa, (N. Mex.)	31.41	106.03	3,830	....	....	....	....	....	....	0.70	3.56	5.25	....	.....	....

The reader will notice the almost entire absence of rain on the Pacific coast in Summer south of lat. 40°.

APPENDIX B.

POPULATION OF THE UNITED STATES AND CANADA.

Year.	United States.	Increase per cent.	Year.	Canada and Maritime Provinces.	Increase per cent.
			1760.	65,000	
1775.....	2,600,000		1775.....	100,000	
1800.....	5,305,000	104.00	1800.....	375,000 (?)	275.00
1825.....	10,638,191	100.49	1825.....	907,000	140.13
1850.....	23,256,972	118.69	1850.....	2,337,862	157.75
1870.....	38,388,153	65.70	1871.....	3,817,213	63.20

APPENDIX C.

SHIPPING.

	Tons.
Great Britain	5,627,500
United States *	1,579,694
Canada	1,029,764
France	985,235
Sweden and Norway	760,028
Italy	700,000
Netherlands	554,244
Spain	367,790
Russia	365,759
Greece	300,000
Prussia	292,256
Hamourg	239,766
Bremen	206,324
Austria	211,287
Denmark	143,320

APPENDIX D.

Revenue, Canadian, all from indirect taxation, 1871	$19,335,560
Expenditure	15,623,081
Which gives a surplus of nearly one dollar for every inhabitant of Canada, and equal to a surplus for Great Britain and Ireland of	30,000,000

Public debt of Canada $20 per head.

Public debt of the United States $60.80 per head, exclusive of State debts, which have nothing to correspond with them in Canada.

Expenditure in Canada, $4.00 per head.

Expenditure in the United States :

Federal tax	$10.28	$21.83 per head.
In State of New York	11.55	

The census, too, gives more property in Canada according to population than in the United States.

*According to British measurement, from which all these estimates are made.

it affords of the attractive and immense field for Immigration now opening up in Manitoba and the North West territories, is calculated greatly to benefit the Dominion.

I hope the Government will cause copies to be freely distributed through the Mother Country and on the continent of Europe.

Believe me, dear Sir,
Respectfully yours,
J. S. DENNIS,
Surveyor General.

From Alexander J. Russell, C.E., Inspector of Crown Timber Agencies, East and West. Author of a most valuable work on the "Red River Country, Hudson Bay and North West Territories."

"A well-timed, well-grounded, and ably-written work."

Also the following:—

Ottawa, 17th April, 1872.

Dear Sir,—I regret that I am prevented from writing to you as fully as the subject merits, by an unexpected pressure of office business, but having carefully perused your book on the Climates, Productions and Resources of Canada, I have only to suggest its being immediately printed. I would also recommend its being translated into German, at least, and that the widest possible European circulation should be given to your much-needed, ably-written and highly instructive work.

Yours very faithfully,
A. J. RUSSELL.

Dr. Hurlbert, Montreal.

The following notice of Dr. Hurlbert's pamphlet, taken from the Montreal *Daily News*, gives an idea of the work, without over-estimating its value:—

"We cannot too highly commend this valuable and highly instructive work to the warm patronage of our reading public, and we earnestly recommend the Minister of Emigration at Ottawa either to transmit copies of it to the different Emigration Agents, or reproduce those pages which will serve to instruct and guide intending settlers.

Every member of the British Lords and Commons should be placed in possession of a copy of this work, which brings out in broad and distinct characters the enormous importance to England, of drawing closer the relations between the Mother Country and her vast possessions on this Continent. We have hitherto been placed at the double disadvantage—that, while great railway corporations in the United States, subsidized by enormous land grants, sent agents to Europe and circulated glowing accounts of the exuberant fertility of the Western States, and the boundless regions fitted for agricultural industries,

with maps which almost ignored our existence, or consigned us the frozen and inhospitable regions, we have neglected to put forth, under authority, anything in the shape of illustrations of the vast territory we possess suited to the habits and industries of Northern nations. This want has been amply provided for in the present work. We have nothing to fear from the most searching criticism and investigation. If we can but gain the attention of the British public, and make them comprehend that the Dominion includes the most valuable portions of the continent; that it is more favorable to health than the United States; and that it contains the widest area adapted to the growth of grains and grasses, then the current of emigration would seek these shores. The chief merit of this work is that, with its charts of isothermal lines and its zones of grain and grass bearing lands, it establishes on indisputable data, that nearly one-half the United States are doomed to eternal sterility; that beyond the 97th meridian, extending from Mexico into the North West, a barren, rainless region extends, effectually excluding all possibility of settlement. West of the Mississippi the tide of emigration must be arrested and the current deflected to the Saskatchewan. To the north of our boundary line the vegetation is always luxuriant and abundant, save that portion where the great American desert is prolonged north of the boundary line, fringing the Rocky Mountains, and approaching the Saskatchewan. The work in question gives the Dominion eleven thousand miles of sea coasts, including indentations round the shores of its islands, gulfs, and bays, abounding in the most prolific fisheries. The writer, drawing his analogies from history, points out that Northern nations have ever been the hardiest, most enterprising and vigorous, and contends that in future the Dominion must become dominant on this continent. It is impossible to follow his statistics, and his copious quotations from authors of admitted veracity, without becoming impressed with the glorious destiny awaiting the Dominion, and feeling proud of an inheritance so richly endowed with the gifts of nature. This work appears at a singularly opportune moment, when the suicidal policy of severing the connection with the Mother Country finds favor with those who, from their position and culture, ought to be aware that the abandonment of the Dominion would be but the prelude to the surrender of every British possession on this side the Atlantic, and reduce England to the rank of a second-class power.'

No work has been issued from the press more calculated to shew the advantages of this country to immigrants than this book of Dr. Hurlbert's. It is clearly and elegantly written. Compiled with great care, and illustrated by maps, the productive powers of Canada are admirably pointed out. A very able production, and it is to be hoped that it may be, as it is said to be intended, translated into the French. —*Ottawa Times.*

OF

TRIBUTION OF THE

GRASSES

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necessary for their growth.

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ner temperatures. - Zones of Grains and Grasses.

region of Summer draughts and high summer
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MEADOWS WITH GRAINS 2,300,000 SQ. MILES IN
REGION
OF SUMMER
DROUGHTS
Polar currents
Tropic currents
Tropic currents of air and Ocean.
Victoria to Jeddo 4200 Miles;
to Hong Kong 5700 Miles.
Victoria to Sidney, New South Wales 6720 Miles.
Victoria to Auckland New Zealand 6105 Miles;
to Owhyhee, Sandwich Isls 2515 Miles.
San Francisco
MEXICO
GULF OF MEXI
HUD
BA
170
160
150
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130
120
110
100
90

MAP OF

THE GEOGRAPHICAL DISTRIBUTION OF THE

GRAINS AND GRASSES

IN

NORTH AMERICA

Drawn from the culture of these Plants in the Zone indicated, as also from the climatal conditions necessary for their growth.

REFERENCES.

Region of Summer Rains and moderate summer temperatures.— Zones of Grains and Grasses.

From the Pacific to the 98th Meridian is the region of Summer draughts and high summer temperature,— Desert and semi-desert areas of the United States.

Region of summer rains and high summer temperatures semi-tropical — South-eastern part of the United States; temperatures too high for grains and grasses in the South and too high for their profitable culture in the North.

Completed Southern Pacific Railway.

Projected Central Pacific Railway.

Projected Canadian Pacific Railway.

HUDSON BAY

JAMES BAY

SES PASTURES AND
LES IN CANADA

GULF OF ST LAWRENCE

Polar currents

Quebec to Liverpool 2502 Miles

New York to Liverpool 2980 Miles

Tropic currents

Canada goes further South than France and to the latitude of Rome

Tropic currents of air and Ocean

Charleston

New Orleans

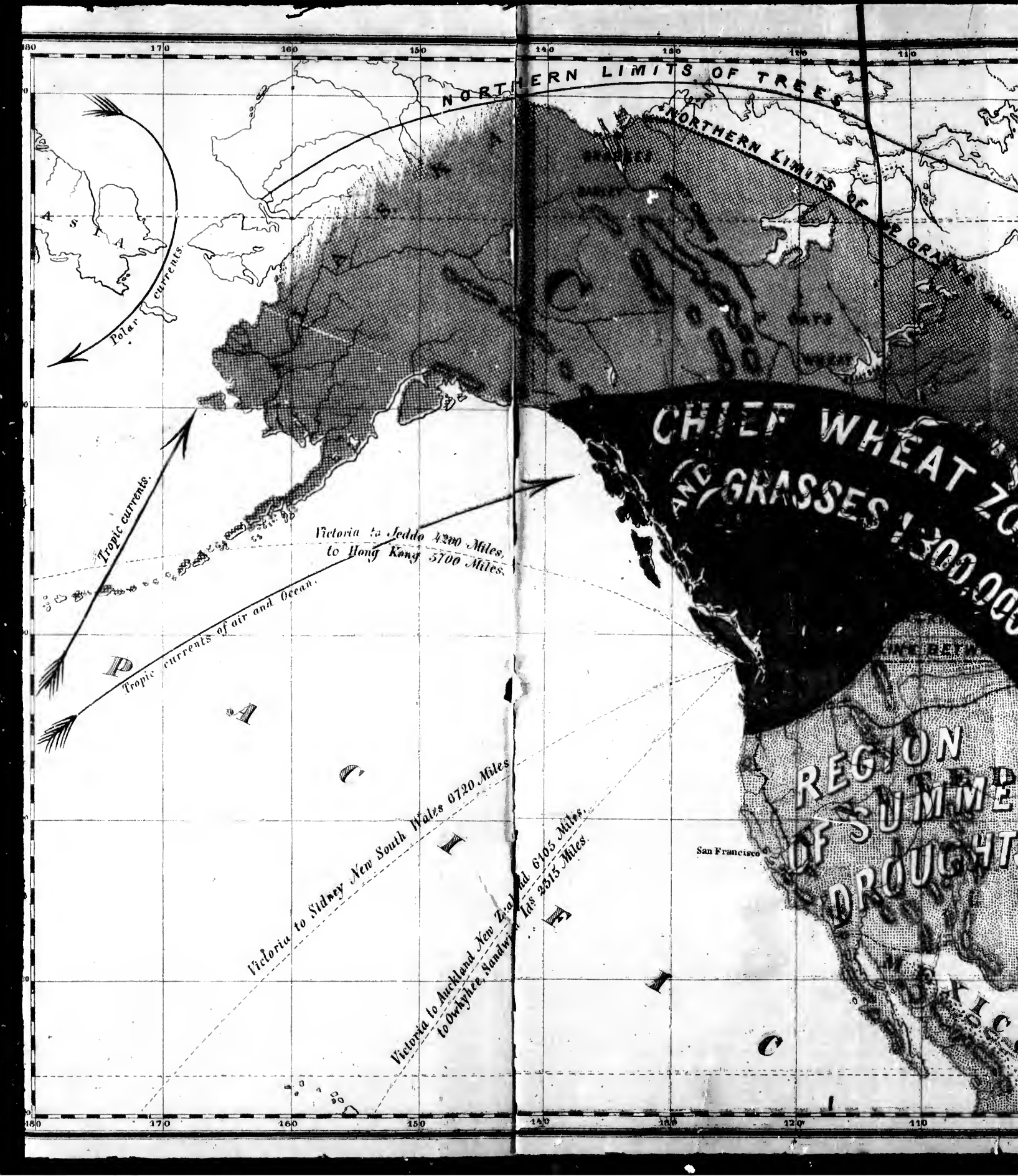
GULF OF MEXICO

CUBA

Lisbon

PORTUGAL

LEGGO & Co STEAM-LITH MONTR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