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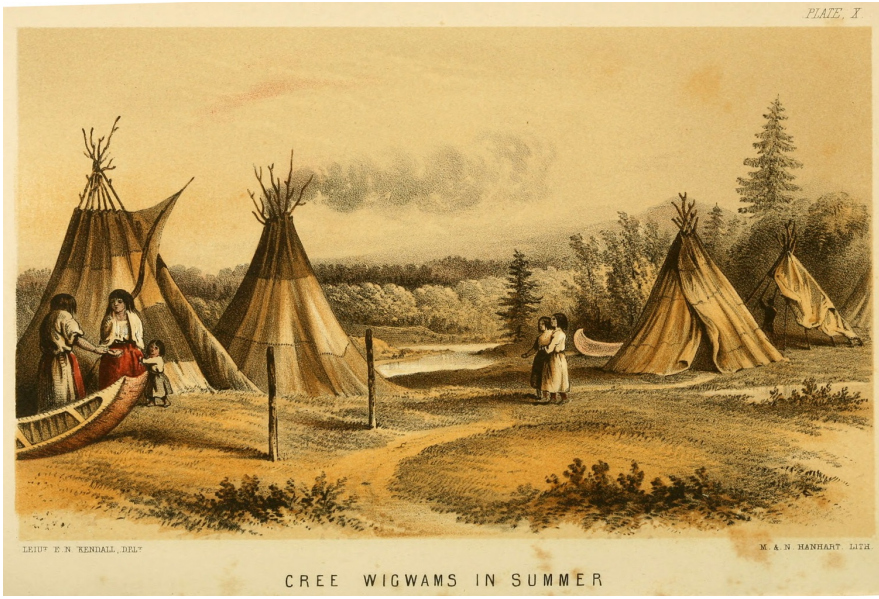

PLATE, X.

LIEU[T]. E. N. KENDALL, DEL[T]. M. &. N. HANHART, LITH.

CREE WIGWAMS IN SUMMER

ARCTIC

SEARCHING EXPEDITION:

A

JOURNAL OF A BOAT-VOYAGE

THROUGH RUPERT'S LAND AND THE ARCTIC SEA,

IN SEARCH OF
THE DISCOVERY SHIPS UNDER COMMAND OF

SIR JOHN FRANKLIN.

WITH AN APPENDIX ON THE PHYSICAL
GEOGRAPHY
OF NORTH AMERICA.

BY SIR JOHN RICHARDSON, C.B., F.R.S.

INSPECTOR OF NAVAL HOSPITALS AND FLEETS,
ETC. ETC. ETC.

IN TWO VOLUMES.

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'Tinnè or *'Dtinnè*, Athabascans, or Chepewyans. Under these national appellations I have to speak of a people whose southern border is the Churchill River, or the *Missinipi*, as it is termed by the Eythinyuwuk, to whom it is also a boundary line. Every where, in the country lying east of the Mackenzie, the *'Tinnè* lands are conterminous with the Eskimo coast, and, to the westward of the Rocky Mountains, with the Kutchin grounds, though the precise geographical limits of the two nations in that direction have not yet been correctly ascertained. The *'Tinnè*, however, extend across the continent, since the *Tā-kuli* and almost the entire population of New Caledonia have been referred by ethnologists to their nation.

The name by which the 'Tinnè designate themselves has, as is usual with the native Americans, the signification of "people," or "the people," and its proper application, when ascertained with care, would seem, at first sight, to be a good test for fixing the nationality of some tribes whose position in the ethnological scale is still uncertain. But as our acquaintance with the various American languages extends, and the way in which the pronunciation of the same word in the mouths of different tribes is gradually modified becomes known, doubts arise as to the value of such a test, or, rather, the opinion of the intimate connection between the various tongues is strengthened, though it may be difficult to trace their links in vocabularies compiled by Europeans. Thus, though no two languages can be apparently more dissimilar than the harsh, guttural, unpronounceable, and unwritable 'Tinnè speech, and the flowing, harmonious, and easily acquired tongue of the Eythinyuwuk, yet the *'Thinyu* (man) of the latter may be resolved into the *'Tinnè*, *'Tinye*, or *'Dunnè*, of the former, and the *Ting-i* of the Kutchin, without much philological artifice.[1]

Various tribes have been distinguished by peculiar names, but there is little variety in their general appearance, and few discrepancies in their dress, customs, or moral character. The Hare Indians (*Kā-cho-'dtinnè*) inhabit the banks of the Mackenzie, from Slave Lake downwards, and the Dog-ribs (*Thling-è-ha-'dtinnè*) the inland country on the east, from Martin Lake to the Coppermine. There is no perceptible difference in the aspect of these two tribes. They meet in the same hunting-grounds at the north end of Great Bear Lake, intermarry, and their speech scarcely differs even in accent. The Hare Indians, frequenting a thickly wooded district in which the American hare abounds, feed much on that animal, and clothe themselves with its skins, while the Dog-ribs depend more upon the rein-deer for a supply of winter dresses, but in all essential respects they are the same people. To the eastward of the Dog-ribs are the Red-knives, named by their southern neighbours the *Tantsa-ut-'dtinnè* (Birch-rind people). They inhabit a stripe of country running northwards from Great Slave Lake, and in breadth from the Great Fish River to the Coppermine. They were also formerly in the habit of resorting to the north end of Great Bear Lake, to kill musk-oxen and rein-deer; but many of their influential men being cut off by treachery in a feud with the Dog-ribs, they have lately kept more towards the east end

of Great Slave Lake. These three tribes roam northwards to the Eskimo boundary line, but mutual fears cause the two people to leave an ample neutral ground, on which neither party are willing to venture.

Other members of the 'Tinnè nation inhabit the country at the mouth of the Missinipi, and carry their furs to Fort Churchill, where they meet the Eskimos that come from the northward, and, through the influence of the traders, carry on an amicable intercourse with them, so that 'Tinnè families occasionally accompany the Eskimos to their hunting-grounds. A wide tract of barren lands intervenes between the Churchill 'Tinnè and the Red-knives, and the tribes on the Slave and Elk Rivers which resort to Fort Chepewyan. These "barren grounds" are very thinly peopled, and rather by isolated families who resort thither for a year or two to hunt the rein-deer than by parties associated in such numbers as to deserve the name of a tribe. Part of these wandering, solitary people resort at intervals of two or three years to Churchill for supplies, and part to Fort Chepewyan, where, from the direction in which they came, they are named *Sa-i-sa-'dtinnè* (Eastern or Rising Sun folks). The Athabasca 'Tinnè, named also Chepewyans, frequent the Elk and Slave Rivers, and the country westward to Hay River, which falls into Great Slave Lake. There is some difference between their dialect and that of the tribes on the Mackenzie, but not so much as to occasion any difficulty to an interpreter, versed in either tongue. The name *Chipewyan* has no relation to the word *Ojibbeway* or *Chippeway*, which designates an Eythinyuwuk people frequenting the coasts of Lake Superior, but has rather, I believe, its origin in the contempt felt by the warlike Crees for the less manly 'Tinnè, whom they oppressed by their inroads, before commerce introduced peace between them. *Chi-pai-uk-'tim* (you dead dog) is a most opprobrious epithet. The appellation of "slave," given to the Dog-ribs by the same people, whose war-parties penetrated even to the banks of the Mackenzie, has a similar origin; and it has been stated in a preceding page, that the Kolushes also called the Eskimo Kadyakers with whom they warred "slaves." To the south of the Athabascans, a number of 'Tinnè frequent the upper part of the Missinipi, where they mingle with the Crees, and in common with them trade with the posts on Lac la Ronge and Isle à la Crosse. (See Vol. I. p. 91.) The *Sarsis* or *Circees*, who live near the Rocky Mountains, between the sources of the Athabasca and Saskatchewan Rivers, are said to be likewise of the

'Tinnè stock.

Between the Peace River and the west branch of the Mackenzie are the Beaver Indians, who take their name from an affluent of the latter. Their dialect is reported to be softer than that of the other 'Tinnè, having probably been modified by their intercourse with the Crees of the prairies. Other tribes on the mountain branch of the Mackenzie differ somewhat either in language or manners from the eastern part of the nation, and have peculiar designations. The *Noh'hannè* inhabit the angle between that branch and the great bend of the trunk of the river, and are neighbours of the Beaver Indians. Higher up are the *'Dtcha-ta-ut-'tinnè*, "Mountain Indians" or "Strong-bows," who keep to the ranges of the Rocky Mountains, and the *Tsilla-ta-ut-'tinnè*, or "Brushwood-people."

Between the trunk of the Mackenzie, on the 65th parallel, and the Rocky Mountain ranges, dwell a tribe named *Dahā-'dtinnè* by the Dog-rib Indians, and *Noh'hai-è* by the Kutchin. They descend the Gravel River to come to Fort Norman, and are ill understood by the Dog-rib interpreters there. In the first volume (p. 180.) I have mentioned, on the authority of Mr. M'Kenzie, that the *Dahā-'dtinnès* name themselves in their own tongue *Cheta-ut-tdinnè*, which indicates their identity with the Strong-bows, both being mountaineers. Further down the Mackenzie, near the 65th parallel, another small tribe also descends from the mountains to visit Fort Good Hope, and is named *Amba-ta-ut-'tinnè*, or "Sheep-people," because they hunt the *Ovis montana* on the mountain-tops. These people speak a dialect of the *'Tinnè*, which is well understood by the Hare Indians.

This enumeration of the various 'Tinnè tribes dwelling on the east side of the Rocky Mountains, all of whom believe that they are sprung from a dog, will give some idea of the geographical extent of the nation. It is not my intention to speak of them severally, as my personal acquaintance is too partial to enable me to state correctly in what respects they differ from each other. The Athabascans or Chepewyans proper have been so long known, and so often mentioned by writers on the fur countries, and Hearne has given so many details of the habits of the 'Tinnè of Churchill, and of the tribes he encountered in his journey over the barren grounds, that I could add little of importance; I shall, therefore, restrict my remarks to the Dog-ribs and Hare Indians, who resorted to Fort Franklin and Fort Confidence during my residences on Great Bear Lake.

These people possess more regular features than the Eskimos, with, at the same time, a greater variety among individuals, many of whom have good profiles. Taken as a whole, they exhibit all the characteristics which we observe in the red races dwelling further south; but their inattention to personal appearance, want of cleanliness, and their abject behaviour, give them a very inferior aspect, particularly when in the company of white people. For they possess the whine and air of accomplished beggars, and their solicitations are constant as long as they have any hope of gain. The women are inferior to the men in height, features, and care of their dress; for, dirty as the men generally are, they do paint their faces and wear ornaments on festive occasions, while few of the women take so much trouble. Most of the latter, however, are tatooed on the chin, or at the angles of the mouth.

The clothing of the men in summer is rein-deer leather, dressed like shammy, and is beautifully white and soft when newly made. A shirt of this material, cut evenly below, reaches to the middle; the ends of a piece of cloth secured to a waistband, hang down before and behind; hose or Indian stockings descend from the top of the thigh to the ankle; and a pair of mokassins or shoes of the same soft leather, with tops which fold round the ankle, complete the costume. When the hunter is equipped for the chase, he wears, in addition, a stripe of white hare-skin, or of the belly part of a deer-skin, in a bandeau round the head, with his lank, black elf-locks streaming from beneath; a shot pouch, suspended by an embroidered belt, which crosses the shoulder; a fire-bag or tobacco-pouch tucked into the girdle; a pair of mittens; and a long fowling-piece in its coat thrown carelessly across the arm or balanced on the back of the neck. The several articles here enumerated are ornamented at the seams and hems with leathern thongs wound round with porcupine quills, or are more or less embroidered with bead-work, according to the industry of the wife or wives. One of the young men even of the slovenly Dog-rib tribe, when newly equipped from top to toe, and tripping jauntily over the mossy ground with an elastic step, displays his slim and not ungraceful figure to advantage. But this fine dress, once donned, is neither laid aside nor cleaned while it lasts, and soon acquires a dingy look, and an odour which can be perceived from some distance. In the camp a smoky, greasy blanket of English manufacture is worn over the shoulders by day, and forms, with the clothes, the bedding by night.

In winter the skins of fawn rein-deer, retaining the hair, are substituted for the shammy leather, and a large robe of the same material is thrown over the shoulders, and hangs down to the feet, in place of the blanket. As the preparation of so much leather and dressed fur keeps the women busy, they are glad to use English cloth, of blue, red, or green colours, or Canadian capots of white or blue cloth, which they acquire at the trading posts in exchange for venison or furs. But with regard to the winter dress especially, the substitution of the produce of the English loom for their native leather is a loss both of comfort and of appearance.

The women's dress resembles the men's, except that the shirt is somewhat longer, and, for the most part, is accompanied by a petticoat which reaches nearly to the knee.

The form of the dress here described is common to the whole 'Tinnè nation, and also to the Crees and Dakotas, though the material varies with the district; moose deer, red deer, or bison leather, being used in the south and west, where those animals abound; and the Hare Indians make their shirts of the skin of the hare. This, being too tender to be used in the ordinary way, is torn into narrow strips, which are then twisted slightly, and plaited or worked into the required shape. I have noticed no process among the northern Indians that approaches so nearly to weaving as the manufacture of these white hare-skin shirts.[2] Such is the closeness and fineness of the fur, that they are exceedingly warm, notwithstanding the looseness of their texture. Though the dress of the southern Indians is after the same pattern with that of the 'Tinnè, the Kutchin, both in the interior and on the coast, form, as has been already mentioned, the hose and shoes of the same piece; thus imitating the Eskimo boot, though with a different material.

The Dog-rib men and women leave their hair without other dressing than simply wiping their greasy hands on the matted locks, when they have been rubbing their bodies with marrow, which they occasionally do.

The Hare Indian and Dog-rib women are certainly at the bottom of the scale of humanity in North America. Not that they are treated with cruelty, for the 'Tinnè are not a cruel people, but that they are looked upon as inferior beings, and in this belief they themselves acquiesce. In early infancy the boy discovers that he may show any amount of arrogance towards his sisters, who, as soon as they can walk, are harnessed to a sledge, and inured betimes to the labours which are their

inevitable lot through life; while the future hunter struts in his tiny snow shoes after the men, and apes their contempt of the women. The women drag the sledges alone or aided by dogs, clear the ground for the tent, cut poles to extend the lodge or tent-skins upon, collect fire-wood, bring water, make all the dresses and shoes, clean the fish, and smoke or jerk the venison for its preservation. They also cook both for themselves and their husbands, the 'Tinnè not holding the opinion of the Kutchin that a man ought not to eat meat prepared by a woman. Neither are the 'Tinnè women altogether precluded from eating with the men; though in times of scarcity the man would expect to be first fed, as it is a maxim with them that the woman who cooks can be well sustained by licking her fingers. The women are not, however, generally discontented with their lot, and better days are certainly dawning upon them, as the opinions of the traders are beginning to tell visibly on the whole nation. Notwithstanding their servile condition they are not without influence over the stronger sex; and they seldom permit provisions or other articles to be disposed of without expressing their thoughts on the matter with much earnestness and volubility.

Few traces of the stoicism popularly attributed to the red races exist among the Dog-ribs: they shrink from pain, show little daring, express their fears without disguise on all occasions, imaginary or real, shed tears readily, and live in constant dread of enemies, bodied and disembodied. Yet all, young and old, enjoy a joke heartily. They are not a morose people, but, on the contrary, when young and in a situation of security, they are remarkably lively and cheerful. The infirmities of age, which press heavily on the savage, render them querulous. They are fond of dancing, but their dance, which is performed in a circle, is without the least pretensions to grace, and is carried on laboriously with the knees and body half bent and a heavy stamping, having the effect of causing the dancers to appear as if they were desirous of sinking into the ground. It is accompanied by a song resembling a chorus of groans, or pretty nearly the deep sigh of a pavier as he brings his rammer down upon the pavement. They are great mimics, and readily ape the peculiarities of any white man; and many of the young men have caught the tunes of the Canadian voyagers, and hum them correctly.

They are an unwarlike people, and averse to shedding blood; yet, as they do not meet their foes in open warfare or man to man, their very

timidity impels them to treachery or a violation of the laws of hospitality, when, by long-continued oppression and the loss of relatives, they have been driven to retaliate upon the few individuals or families of the domineering tribe who were living in confidence among them. This remark applies directly to their feud with the Red-knives, who for many years resorted to the hunting-grounds of the Dog-ribs, tyrannised over them, and carried away their women. This was long borne, but at length, some lives having been lost in the contests which occasionally ensued, the Dog-ribs, watching their opportunity, cut off several leading Red-knives and their families, who, not dreading any thing at the time, were scattered among the Dog-rib encampments. The details of these reprisals give a curious insight into the character of the people. Some of the victims, deprived of the means of resistance, and aware of their intended fate, travelled for a whole day with the hostile party; but the latter required to have their passions roused by altercation before they acquired sufficient boldness to perpetrate the deed, and were finally incited to its commission by the sufferers demanding to be killed at once if their death was intended, for they would go no further. When the husbands and grown men were killed, the Dog-ribs argued that pity impelled them to slaughter also the wives and children, who would be unhappy and perish for want, having lost their means of support. To a people who could no longer support the tyranny of their bolder neighbours, nor combine so as to repel aggression by force, treachery seemed to be the only mode of obtaining redress; and in fact the extent to which they carried their reprisals effectually broke the spirit of the Red-knives, and drove them to a distance.

The Dog-ribs are practical socialists; and, as much of the misery they occasionally experience may be traced to this cause, the study of the working of such a system may be instructive in a community like this, whose members owe their condition in the social scale solely to their personal qualities, and not to inheritance, favour, or the other accidents which complicate the results in civilised life. Custom has established among them a practice universally acted upon,—that all may avail themselves of the produce of a hunter's energy and skill; and they do not even leave to him the distribution of his own game. When it is known in the camp that deer have been killed, the old men and women of each family sally forth with their sledges, and, tracing up the hunter's footsteps

to the carcases of the animals he has slain, proceed to divide them among themselves, leaving to the proper owner the ribs, which is all that he can claim to himself of right. He has also the tongue, which he takes care to cut out on killing the deer. It is not in the power of these people to restrain their appetites when they have abundance; and the consequence is, that when the chase is successful, all the community feast and grow fat, however little many of the men—and there are not a few idle ones—may have contributed to the common good. The hunter's wife dries the rib-pieces, after cutting out the bone, in the smoke, or over a fire, to carry to a fort for the purposes of trade; but, unless there is a superabundance, little provision is made by the party for a time of scarcity, which is sure to arrive before long; since the deer, when much hunted, move to some other district. Taught by their frequent sufferings on such occasions, the more active hunters frequently withdraw themselves and their families from the knowledge of the drones of the community, leaving them at some fishing station, where, with proper industry, they may subsist comfortably. A fish diet is not, however, agreeable to the palates of these people for any length of time; and, as soon as rumours of a hunter's success reach them,—which they do generally much exaggerated by the way,—a longing for the flesh-pots is instantly excited, especially among the old, and a general movement to the hunting-ground ensues. If, on their march, the craving multitude discover a hoard of meat stored up by any of the hunting parties, it is devoured on the spot; but they are not always so fortunate. Before they reach the scene of anticipated abundance, the deer may have gone off, followed by the hunters, with uncertain hopes of overtaking them, and nothing remains for the hungry throng, including the old and the lame, but to retrace their steps, with the prospect of many of them perishing by the way, should their stock of food have been quite exhausted. Such occurrences are by no means rare; they came several times under our immediate notice during our winter residence at Fort Confidence, and similar facts are recorded by Mr. Simpson of the same tribe. This gentleman expresses his opinion that the charge made against this nation, of abandoning their infirm aged people and children, had its origin in the *sauve qui peut* cry raised during a forced retreat from some one of these most injudicious excursions; and I am inclined fully to agree with him; for I witnessed several unquestionable instances of tenderness and affection

shown by children to their parents, and of compliance with their whims, much to their own personal inconvenience. The grief they show on the loss of a parent is often great and of long continuance, and it is the custom both for men and women to lament the death of relations for years, by nightly wailings.

Hospitality is not a virtue which is conspicuous among the Dog-ribs, who differ in this respect from the Eythinyuwuk, in whose encampments a stranger meets a welcome and a proffer of food. It is not customary, however, for the Dog-rib to receive the traveller who enters his tent with the same show of kindness. If he is hungry, and meat hangs up, he may help himself without eliciting a remark, for the 'Tinnè hold it to be mean to say much about a piece of meat; or he may exert his patience until some cookery goes on, and then join in the meal; and should there be venison at hand, he will not have long to wait, for every now and then some one is prompted to hang a kettle on the fire, or to place a joint or steak to roast before it.

Another habit which darkens the shade in the character of these Indians is that of lying, which they carry to such an extent, even among themselves, that they can scarcely be said to esteem truth a virtue. If a young man has been successful in his morning's hunt in a time of famine, he does not rush into his family circle with joy beaming on his countenance, to tell that there is food, but, assuming an aspect of sadness, squats himself in silence beside the fire. The women with doubt and anxiety examine his shoes and dress for spots of blood, that may betoken the death of an animal, but discovering none, put the question, "Did you see no deer?" "Not one, the deer are all gone, not a single footstep was to be seen." When the colloquy has continued for a time, and hope seems to be extinct, he then draws out from beneath his shirt two or three tongues, as the case may be, and says with an air of the utmost indifference, "You may go for the meat." It is not, however, merely at such times, and to enhance the pleasure by previous disappointment, that truth is violated, but on almost every occasion; and the skill of an Old Bailey practitioner would find exercise in eliciting facts from the mass of contradictions with which they overload them. A story which was at first a pure invention, or perhaps, a perversion of some simple occurrence, becomes so changed by the additions it receives in its transmission from individual to individual, that it deceives the originators,

and if it bears on the safety of the community, may spread consternation among them, and occasion a hasty flight.

It is pleasant, instead of dwelling longer on this defect, to turn to another feature—their strict honesty; the practice of the 'Tinnè with regard to the property of white people differing remarkably from their northern neighbours, the Eskimos, and their southern ones, the Crees, though the temptations to which they are exposed are equally great. No precautions for the safety of our property at Fort Confidence were required. The natives carefully avoided touching the magnetic instruments, thermometers, and other things placed outside the house, and could be trusted in any of the rooms without our finding a single article displaced. Our dining-hall was open to all comers; and though the smallness of our separate apartments caused us to exclude hangers on, new comers were permitted to satisfy their curiosity respecting our occupations, and they always squatted themselves down at the door, and looked on in silence, wondering, as we were told, at our constant writing. From M. La Flèche, the intelligent missionary at Isle à la Crosse, I received a similar character of the southern part of the nation, who, if they find any article left by the voyagers on the portages, are sure to bring it in to be claimed at the forts.

Of the peculiarities of their religious belief I could gain no certain information. The interpreters to whom I applied for assistance disliked the task, and invariably replied, "As for these savages, they know nothing; they are ignorant people." The majority of the nation recognise a "Great Spirit," at least by name, but some doubt his existence, assigning, as a reason for their atheism, their miserable condition; or they say, "If there be such a being, he dwells on the lands of the white people, where so many useful and valuable articles are produced." With respect to evil spirits, their name in the Dog-rib country is legion. The 'Tinnè recognise them in the Bear, Wolf, and Wolverene, in the woods, waters, and desert places; often hear them howling in the winds, or moaning by the graves of the dead. Their dread of these disembodied beings, of whom they spoke to us under the general name of "enemies" is such, that few of the hunters will sleep out alone. They never make any offerings to the Great Spirit, or pay him an act of adoration; but they deprecate the wrath of an evil being by prayer, and the sacrifice of some article, generally of little value, perhaps simply by scattering a handful of deer-hair or a few feathers.

The dead are not burnt, after the manner of the Kolushes, but are buried. In lamenting for deceased relatives the mourners sometimes gash their bodies or limbs with knives, but more rarely now than in old times. It was formerly the custom, on a death occurring, for the family to abandon every article they possessed, and betake themselves in a perfectly destitute condition to the nearest body of their own people, or to the trading post. The advice of the traders is gradually breaking down this practice.

Shamanism does not seem to exert the important influence upon the 'Tinnè that it does among the Asiatic Tchukche, the Kutchin, or the Eskimos. There are men in the nation, with the reputation of sorcerers, who profess to have power over spirits; but they have but little personal influence, and are generally of small repute, to which, perhaps, the contempt of the white people for their arts contributes. A belief, however, in the power of the Eskimos and of strange Indians to hurt them by incantations, or "bad medicine," prevails. White people are said to be exempt from such dangers, their "medicine" being the most powerful. The "conjurers" are occasionally employed to cure the sick, and I suppose on such occasions receive some reward; but I heard of no instance of their being beat and coerced to influence the spirits favourably in the manner that the Asiatic Tchukche are reported in Baron Wrangell's work to deal with their shamans.

Among the Crees the conjurers perform a much more prominent part than with the 'Tinnè, and their practices come frequently under the observation of residents on the lands of that people; but I never saw one exhibit among the Hare Indians, Dog-ribs, or Red-knives, in the course of four or five years passed among them, though I have many times seen some of the old men throw trifling articles into the water, to procure a fair wind, or secure a safe passage across a lake or down a rapid.

From a people so liable to be actuated by fears of imaginary evils no steady line of action can be expected, and the Dog-ribs are in reality as volatile as children. When accompanied by a white man, they will perform a long journey carefully to a distant post; but we found, by experience, that however high the reward they expected to receive on reaching their destination, they could not be depended upon to carry letters. A slight difficulty, the prospect of a banquet on venison, or a sudden impulse to visit some friend, were sufficient to turn them aside for

an indefinite length of time.

In general, the ’Tinnè have only one wife, the numbers of the sexes being equal, or the males rather predominating. The women are married very young, but the man must have shown some skill in hunting before he obtains a helpmate readily. The consent of the parents is usually gained by the suitor, and is seldom withheld from a man whose activity promises the old folks some addition to their comforts or consequence. The woman’s wishes have, perhaps, some weight with her parents, but I could not ascertain that any show of courtship[3] was made, or that her disinclination was allowed to interfere with the man’s determination to take her, if the parents did not oppose. No ceremony attends the union. Hearne says, that it is the established etiquette among the Eastern ’Tinnè for the woman to affect unwillingness to change her condition, and for the man to rush into her father’s tent, and drag her off by the hair of the head. We witnessed no scene of this kind among the Dog-ribs, but more than once saw a stronger man assert his right to take the wife of a weaker countryman. Any one may challenge another to wrestle, and, if he overcomes, may carry off his wife as the prize. The younger children generally follow the fortunes of the mother, but the father may retain them if he chooses. In such contests, it is suspected that the wife sometimes prompts the aggressor; but I have been told—for I never actually witnessed one of these wrestling matches—that she looks on with composure and impartiality, and does not insult her late master with a display of pride on being the object of such a struggle, the *causa teterrima belli*. The bereaved husband meets his loss with the resignation which custom prescribes in such a case, and seeks his revenge by taking the wife of another man weaker than himself. From a passage in one of Mr. Murray’s letters, I infer that this practice extends to the Kutchin, but it is unknown among the Cree tribes, and does not exist among the Eskimos. The ’Tinnè are said to be jealous of their wives; but rather, I believe, lest they should be enticed away, than from any nice sense of honour. The laxity of morals, however, with respect to female chastity, which prevails in the Eskimo tribes is not conspicuous in the ’Tinnè, and is, perhaps, contrary to the national character, though some corruption may have crept in through their acquaintance with white people.

Before the introduction of articles of European manufacture, the

’Tinnè caught fish with hooks of bone, or speared them with weapons pointed with bone or copper. Some of their fish harpoons were constructed very artistically. They also used, and still continue to use, nets made of lines of twisted willow bark, or thin stripes of deer-hide cut very evenly. Nets are unknown among the northern tribes west of the Mackenzie, and some of the parties of the Eskimos that we saw declared their ignorance of their use. On the banks of the Mackenzie and other rivers frequented by moose-deer, these animals are hunted in spring by a small breed of dogs, which run lightly over the crusted snow, and hold the animal at bay until the Indian comes up in his snow shoes. At other times of the year, the success of the Hare Indians and Dog-ribs in killing the moose is small, as they have not the skill of approaching so wary an animal which the Athabascans and Crees possess. Rein-deer are captured in pounds and by nooses, but are in the present day more generally killed with the fowling-piece, which is also the weapon used against the musk-ox. The pounds are formed on the verge of the woods, and are made with much less labour than those of the Kutchin; yet, as they need the exertions of all the community for their construction, the indolence of the major part causes them to be rarely made. The black bear is snared or shot, but few of the Dog-ribs will venture to attack the “brown barren-ground bear,” whose fierceness, or, as they say, “potent medicine,” appals them. It is killed by them, however, without risk when it is detected hybernating under the snow in spring.

Order is maintained in the tribe solely by public opinion. It is no one’s duty to repress immorality or a breach of the laws of society which custom has established among them, but each opposes violence as he best may by his own arm or the assistance of his relations. A man’s conduct must be bad indeed, and threaten the general peace, before he would be expelled from the society; no amount of idleness, nor selfishness, entails such a punishment. Superior powers of mind, combined with skill in hunting, raise a few into chiefs, under whose guidance a greater or smaller number of families place themselves; and a chief is great or little, according to the length of his tail. His clients and he are bound together only by mutual advantage, and may and do separate as inclination prompts. The chief does not assume the power of punishing crimes, but regulates the movements of his band, chooses the hunting-ground, collects provisions for the purchase of ammunition, becomes the

medium of communication with the traders, and extends his sway by a liberal distribution of tobacco and ammunition among his dependents. At present, the rank of a chief is not fully established among his own people until it is recognised at the fort to which he resorts. The Company send in annually a number of red coats, ornamented with lace, for presents to the chiefs, which are worn as badges of office on great occasions. The power of a chief varies with his personal character. Some have acquired an almost absolute rule, by attaching to themselves in the first instance an active band of robust young men, and using them to keep in order any refractory person by claiming his wife after the custom of the tribe. It is in vain in such cases that the poor husband, dreading to be deprived of his most valuable property, retires to a remote hunting-ground; for he is sure to receive a message, from some passing Indian, expressive of the chief's intentions; and he generally comes to the conclusion that submission is the best policy. He is certain to fall in with the chief and his band sooner or later, either as he goes to the fort for supplies of ammunition or elsewhere. A free expenditure by the chief of the presents he receives from the traders, and even of the produce of his furs, is a main bulwark of his authority, in addition to the skill which he must possess in the management of the various tempers with which he has to do.

The sounds of the 'Tinnè language can scarcely be expressed by the English alphabet, and several of them are absolutely unpronounceable by an Englishman. In my attempts to form a vocabulary I had great difficulty in distinguishing several words from one another which had dissimilar sounds to the native ear, and were widely different in their signification. A Dog-rib or Athabascan appears, to one unaccustomed to hear the language, to be stuttering. Some of the sounds must have a strong resemblance to the Hottentot cluck, and palatal and guttural syllables abound in the language. Vocabularies of this tongue cannot be greatly depended upon, as no two people will agree on the orthography.

With respect to the future prospects of the 'Tinnè, the nation in general may be said to be more docile and confiding, and more directly under the influence of the traders, or of missionary exertions, than their southern neighbours, the Crees. As yet, Roman Catholic missionaries alone have entered the 'Tinnè country, and they have already a large number of nominal converts. For some years Canadian priests from the Red River colony went annually to Methy Portage, where many of the

Athabascans and Churchill River 'Tinnè congregate at the usual season of transporting the outgoing furs and incoming supplies. On these occasions, numbers of the Indians were baptized, a considerable inducement to submit to the rite being the present of a piece of tobacco, or perhaps some vague notion of the protection thereby afforded against evil influences. There was no time to instruct them in the truths of the Christian religion, and this could be but very imperfectly done through the medium of interpreters. In 1846, however, the Roman Catholic mission under Monsieur La Flèche was established, as has been mentioned in a preceding chapter. This gentleman and his associate, Monsieur Taschè, members, I believe, of the Society of Jesus, applied themselves to the study of the 'Tinnè language, and were soon enabled to teach many of their converts to read and write.

By sympathising with their people in all their distresses, taking a strong interest in every thing that concerns them, by acting as their physicians when sick, and advisers on all occasions, the priests of the mission have gained their entire confidence. It is not likely that Protestant missionaries, coming later into the field, will succeed in introducing their more spiritual but less imposing form of worship among a people whose first teachers have been so successful.

When the fur traders first penetrated to the Elk River, the Athabascans had only a small breed of dogs useful for the chase, but unfitted for draught; and the women did the laborious work of dragging the sledges. Now the cultivation of a stouter race of dogs has in some respects ameliorated the lot of the females, and within a few years the acquisition of horses by many of the natives on that river has introduced a still greater improvement. Houses are beginning to be built, and the more provident and staid of the people have fixed homes to retire to. With the means of securing their property and provisions, new ideas respecting them spring up, and a revolution in the opinions of the nation is evidently in progress. Recently, also, it has been the policy of the Hudson's Bay Company to employ many of the young natives, during the summer, in navigating their boats to the depôts, and back again to the outposts. By these trips prejudices are broken down; the youth acquire information and habits of labour and steady industry, and, being well paid, the clothing they purchase gives them respectability in the eyes of their countrymen. A generation has passed away since the whole Indian

country was demoralised by the opposition of trading companies, and the present race of Chepewyans are ignorant of the use of spirituous liquors.

Of the nations belonging to the 'Tinnè stock who inhabit the country west of the Rocky Mountains, the *Tā-kuli* or Carriers occupy the greater part of New Caledonia. They subsist chiefly on fish, and their name denotes people employed on the waters. They burn their dead; the widow becomes the servant of the relations, is harshly treated, and is compelled to carry about with her for several years the ashes of the deceased. When the time of her trial ends, a feast is made by the kindred, and she is at liberty to marry again. A custom somewhat similar prevails among the Chippeways. The *Tsitka-ni*, who dwell between the Stikeen and Simpson's Rivers to the north of the Carriers, are said also to be of the same stock. They bury their dead, and are hunters.

In addition to these tribes, a detached portion of the 'Tinnè people is mentioned by Dr. Latham, under the name of Southern Athabascans. They occupy the sea-coast from the north bank of the Oregon southwards, to the River Umqua, in 43½° of lat. For an account of these, I must refer the reader to the works of the author just named, and to the Transactions of the American Ethnological Society from which he quotes.

Dr. Latham may, also, be consulted for an account of four or five isolated languages, spoken by tribes that interpose between the North and South Athabascans to the west of the Rocky Mountains, and for notices of the inhabitants of the Archipelago skirting that coast. The Kolush language ends, he thinks, at the north end of King George's Archipelago.

The *Chenooks*, one of these isolated people, are noted for their habit of flattening the foreheads of their infants artificially, a custom which crosses the continent southwards to the coast of Florida, and was practised, though not exactly in the same way, by the extinct Peruvian races of Lake Titicaca.[4]

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[1] Mr. Isbister says the Chepewyan tongue is "harsh and guttural, difficult of enunciation, and unpleasant to the ear." "As a language it is exceedingly meagre and imperfect."—*Rep. Brit. Ass.* for 1847. Mr. M'Pherson pointed out to me, as a curious

coincidence, the similarity in sound of the Gaelic word for people, with the *'Dunnè* of the Dog-rib Indians.

[2] The Kenaiyer of Cook's Inlet are said to weave the wool of the mountain goat (*Capra americana*) into a stuff used for clothing.

[3] The term "dear," or "beloved," is said to be unknown in the language; and Captain Lefroy, who tried to ascertain if it was so, says, "I endeavoured to put this intelligibly to Nannette, by supposing such an expression as *ma chère femme*; *ma chère fille*. When at length she understood it, her reply was (with great emphasis), '*I' disent jamais ça; i' disent ma femme; ma fille.*'"

[4] Among some good examples of flattened skulls from the west coast of America, in the Museum at Haslar, there is the remarkable one of Comcomly, the hero of Washington Irving's Astoria.

CHAP. XIV.

EYTHINYUWUK, OR CREES AND CHIPPEWAYS.

NATIONAL NAMES.—DIVISION.—TRIBES.—TERRITORY.—WARS WITH THE MENGWÈ.—CONVENTIONAL CHARACTER NOT TRUE.—PERSONS.—GAIT.—CRIMES.—WABUNSI.—WIGWAMS.—RELIGIOUS BELIEF.—VAPOUR BATHS.—EVERLASTING FIRE.—ITS RITES.—USED IN SICKNESS.—ITS PRIESTS.—ITS ORIGIN.—CHIEF SUN.—POLICY.—CALUMET.—MAIZE.—FOOD.—REINDEER.—BISON.—WHITE-FISH.—EARTH-WORKS.—POTTERY.—LANGUAGE.—HALF-BREEDS.—COLONY OF RED RIVER OR OSNABOYA.—SPIRITUOUS LIQUORS.

The people who designate themselves *Eythinyuwuk* or *Ininyu-wë-u*, occupy the country lying between the Rocky Mountains and Hudson's Bay, and reaching from the 'Tinnè boundary down to the plains of the Saskatchewan and valley of the St. Lawrence; their hunting-grounds on the plains interlocking with those of the Dakotas or Sioux. They are identified as a nation with the Algonkins and Lennilenape or Delawares, who once owned the whole country east of the Mississippi as far south as Carolina, but who, blighted by the precocious expansion of the Anglo-Saxon colonists, have dwindled down to a few remnants of mixed blood. The generic term Algic, taken from the root of the word Algonkin, has been employed by the philologists of the United States to comprehend all the tribes who speak dialects of the Algonkin tongue, and whose southern limits are stated by Schoolcraft to be conterminous with the *Catawbas*, *Creeks*, *Cherokees*, *Chactas*, and *Chickasas*. The tract which they occupied in the year 1600 includes the whole area of the United States east of the Mississippi, north of these nations, excepting the grounds of several tribes of the Iroquois race, north and south.[5] In 1603, when the French settled in Canada, the Algonkins, according to Colden, were "the most warlike and polite nation in all North America."

The national name of this people is derived, according to the custom

of the Americans, from the word "man," which is in different dialects *Ethinyu*, *Ethin-u*, *Inin-yu*, or *Ininè*.[6] According to Schoolcraft, they do not call themselves *Unischauba*[7], or "aborigines," but, on the contrary, have a tradition current among the southern members of the nation, that the country they now hold was previously possessed by the *Alligèwi*, of whom the name only remains in the appellation of the Alleghany Mountains.

Before the European invasion, the Dakota, Huron, Oneida, Mohawk, and Iroquois association, or *Mengwè*[8], generally known as the "Five nations," had penetrated into the *Eythinyuwuk* territory by way of the Missouri and St. Lawrence. The contests by which the Mengwè established themselves in a district, surrounded on all sides by their enemies, must have been severe; and they are not even now ended, but are carried on in the country between the Saskatchewan and Missouri, notwithstanding the persevering efforts of the Hudson's Bay Company and the officers of the American outposts to suppress them. Deadly feuds exist between the Blackfeet Eythinyuwuk, and the Mandans, Minetares[9], and other Dakota tribes which frequent the bison plains; and on the Red River of Lake Winipeg, fatal conflicts took place in the last year, between the Chippeways and the Sioux, who are Dakotas.

Dr. Latham states that the *Shyennes*, who dwell on the head waters of the Yellow Stone and Platte Rivers, are of the Algonkin race, though insulated by other people from the rest of their nation; and that there is in like manner a southern detachment of Iroquois (*Tuscaroras*, &c.), between whom and their countrymen the Delawares interpose; but as I mean to restrict myself to the St. Lawrence Valley, and the country lying north of it, I must refer the reader who wishes for a general classification of the native American races, to the "Natural History of the Varieties of Man," by the learned author just named.

The various tribes of Eythinyuwuk assume local designations from the rivers or other remarkable features of the districts they inhabit, and they have also names of more general import. Thus the northern ones, who border on the 'Tinnè, call themselves *Nathèwy-withinyu*, *Nehethè-wuk*, or *Nithè-wuk*[10], "Exact or complete men." These are the Crees of the fur traders; and Mr. Howse, though he does not publish the grounds of

his opinion, considers them to be the stem of the Algonkin race. On the south of these, in the country extending from Lake Winipeg to the south side of the basin of Lake Superior, dwell the *Odchipewa* (Chippeways or Ojibbeways, called also *Sauteurs*[11] or *Sotoos*). A third great division of the nation name themselves *Lenni-lenape* (Delawares), which denotes "Uncommon men."[12]

The Iroquois name the Algonkin race *Adirondak*, and Mr. Schoolcraft thinks that this appellation, being still retained for the highlands at the source of the Hudson, countenances the traditions current among the western Algonkins, that their ancestors came from the eastern coast. It is probable that the Mengwè, on the contrary, advanced from the west, if we may judge by the way in which their tribes are distributed. The aggressive movements, however, of the two nations, would throw little light on the primary peopling of the continent, even were they ascertained, since there are traces of their respective districts having been previously occupied by a people of small stature but superior in the arts, who have left memorials of their existence, in numerous and extensive earth-works, and mounds of ancient date, wherein copper bosses overlaid with silver have been found. The shafts or galleries lately discovered at the copper mines on the south side of Lake Superior, containing immense quantities of stone chisels, betoken a people more advanced than the Canadians were on the first arrival of the French; and are said to be now followed by the American miners, as guides to the most valuable deposits of native copper.

The wars of the *Eythinyuwuk* and the *Mengwè* with each other, or with Europeans, have been recorded by many pens, and have supplied incidents for numerous works of fiction, in which the writers have ascribed a loftiness of soul and other noble qualities to these people, of which it would be in vain to seek traces in the present day; and we may without much scepticism assert, that they never really possessed them. Actions prompted only by the caprice of a barbarous people, have been considered as the results of refined sentiment; and savage cunning, seen through a false medium, has been elevated to the promptings of far-seeing policy. The revolting cruelty with which they tortured prisoners of war, and the stoicism with which, when vanquished, they endured such treatment in their turn, are more certain traits of character. A few men, remarkable for their powers of mind, have certainly appeared among the

Eythinyuwuk nations, and from them the abstract idea of a North American Indian has been formed by Europeans.

Among this people there are to be found finer examples of the human figure, handsomer countenances, and a more manly and independent carriage, than among the Eskimos and 'Tinnè; and West's exclamation on seeing the Apollo Belvidere, that he was a young Mohawk warrior, may be adduced as evidence of the natural grace which a ranger of the woods, unfettered by artificial restraints, may possess. In fact, the attitudes of the Eythinyuwuk are occasionally, and especially when actuated by strong passion, striking, and sometimes elegant; yet the habitual gait of the Red man is not a graceful one. The toes are turned in; the step, though elastic, has an appearance of insecurity, and is by no means majestic, nor even pleasing, to one unaccustomed to see the centre of gravity thrown so much forwards. Even though the palm of personal appearance be given to the Eythinyuwuk, in moral conduct I hold them to be decidedly inferior to the Eskimos and 'Tinnè. They are less honest, and though perhaps not so much given to falsehood as the 'Tinnè, are more turbulent and more prompt to invade the rights of their countrymen, as well as of neighbouring nations. Their wars are carried on by ambuscade and treachery, seldom in open field: they spare neither infants nor women in their forays; and instances of personal bravery, such as the Eskimos often exhibit, are rare indeed among them. The worst of the vices of which St. Paul accuses the heathen world are said to exist among the Crees of the plains, and gambling is practised to excess by the whole nation.[13] One game in which the odd or even number of pebbles, and the hand in which they are held, are to be guessed, is constantly resorted to whenever two or three meet together, and it is accompanied by singing and gestures, indicating some kind of divination. They will pass a whole day so occupied, and will stake all that they hold most valuable on the result.

As the Narrative of Sir John Franklin's First overland Expedition in 1819-21 contains all the particulars of the manners and religious belief of the Crees, or *Nethewuk*, that I had then collected, I shall not here repeat them; but shall merely allude in a brief way to such of their habits and usages as have not been noticed among the 'Tinnè.

The ordinary wigwams[14], skin tents, or "lodges" as they are called, of the two people are exactly alike as to form, being extended on poles

set up in a conical manner; but, as a general rule, the tents of the Crees are more commodious, and more carefully and frequently supplied with a fresh lining of the spray of the balsam fir. This people also occasionally erect a larger dwelling of lattice work, covered with birch bark, in which forty men or more can assemble for feasting, debating, or performing some of their religious ceremonies. These erections are chiefly made on the skirts of the bison plains, or in localities where a large number of the nation are accustomed to assemble together. The entire nation of the Eythinyuwuk cultivate oratory more than their northern neighbours, who express themselves much more simply and at the same time with much less readiness.

Neither among the Eskimos nor 'Tinnè did I observe any image or visible object of worship; but most of the Crees carry with them one or more small wooden figures rudely carved, some of which they state to be representatives of a malicious or at least capricious being named *Kepuchikan*[15], to whom they make offerings. They acknowledge other spirits or *Manito-wuk*, and demons or vampires called *Witako*; but I could not ascertain that prayer was ever made to the *Kitche-manito*, the "Great Spirit" or "Master of Life." The vapour-bath, which is comparatively seldom used by the 'Tinnè, is in frequent request with the Crees, and is more or less connected with religious observances. It is the great medium by which the shamans or conjurors cure the sick. The operator in this case shuts himself up with his patient in the sweating-house, where he shampoes him, singing all the time a kind of hymn. As long as the shaman can hold out, so long must the sick man endure the intensely hot atmosphere, and then, if the invalid be able to move, they both plunge into the river.

One custom of the Chippeways which fell into desuetude after the arrival of the French on the Great Lakes, is still preserved by tradition in the tribe. It was an institution for preserving an eternal fire named *Kagagish'koda*.[16] Mr. Schoolcraft gives the following account of the rites and duties connected with it, which I make no apology for quoting, as so singular a custom, related on such good authority, deserves to be mentioned, when the peculiar habits of the race are spoken of.

"The Chippewa tribe had its council-house, and the seat of eternal fire, on the south side of Lake Superior, west of Keeweenau Point. Here lived the principal chief, called the *Mutchèkewis*, who exercised more

authority, and assumed more state, than would be compatible with the present feelings of the Indians. The designation was official, and not personal, and the office was hereditary in the direct male line. He was supported by voluntary contributions, his *mushinawa*, or provider, making known from time to time his necessities by public proclamation. Whatever was required on these occasions, whether food or clothing, was immediately furnished. He appears to have been the chief priest, and could neither engage in war nor hunting."

"In the village where he resided, and near his cabin, the eternal fire was kept burning. The altar was a rude kind of oven, over which no building was erected. Four guardians were selected by the Mutchèkewis, to take care of the fire. Two of these were men, and two women. They were all married; but the wives of the men employed on this service, were required to cook and do the necessary domestic work, while the husbands of the women destined to the sacred duty were always engaged in hunting, and in providing whatever else was wanted. The four persons devoted to the altar were thus left without any secular cares to divert their attention from the holy trust committed to them. A perpetual succession was kept up in the priesthood, by a prerogative of the Mutchèkewis, and the principal head woman; the former selecting a husband, and the latter a wife for the survivor, whenever one of these eight persons died. The chain was thus always unbroken, and the traditionary rites transmitted unimpaired. Death was the penalty for any neglect of duty, and it was inflicted without delay and without mercy."

"The council fires were lighted at the great fire, and carried wherever the council was held. After the transaction of the business, a portion of it was carefully returned and the remainder extinguished. Whenever a person became dangerously ill, if near enough, he was taken to the house of the Mutchèkewis where his fire was extinguished, and a brand was brought from the altar and a fire kindled, at which a feast was prepared. A great dance was then held, and the viands consumed. And it is added that the patient seldom failed to recover.

"Once in eight years, the whole Chippewa tribe assembled at their principal village, about the season of the swelling of the buds. Early in the morning the great pipe was lighted at the sacred fire, and delivered to the Mutchèkewis. He took one smoke, and then handed it to the women, and these to the men, by all of whom it was in like manner smoked. It

was then passed to the children. This ceremony consumed the day, and early next morning a feast was held, at which the men and women and children sat in separate groups. This feast was partaken silently, and without singing or dancing. In the evening they departed to their different villages."

"The principal male attendant on the Kaugagis-koda was the *Kauga-gizhek*, or "Everlasting Sun;" and his assistant was named *Kanawaudenk-shkuda*, or the "Fire Keeper." The principal female was called *Gaubewekwa*, or the "Everlasting standing woman;" and her assistant *Kabagaubewekwa*, "The woman who stands all the time."

"The Chippeways assert that they received this custom from the *Shawnees*, who are the most southern of the western Algonkins, their country being in the present state of Kentucky. Traces of its prevalence at a former period among other North American nations exist. The Natchez and most of the Louisiana tribes are represented by Charlevoix as having had a perpetual fire in their temples. Both he and Du Pratz were eye-witnesses of the rite. The hereditary ruler, or "Chief Sun," whose title was equivalent to that of Inca or Emperor, exercised a more despotic power than appears to have been permitted in any other nation north of Mexico. This power and this worship were kept up with an oriental display of honor and ceremony long after the French had settled in the valley of the Mississippi, and indeed up to the destruction of the nation by them in 1729. 'The Sun has eaten,' proclaimed an official functionary daily, before the Ruling Sun, after his morning's repast; 'the rest of the princes of the earth may now eat.'"

From this interesting extract we may gather, that the Algic race were much more advanced in the forms of government and association of tribes than the more northern nations, and especially than the 'Tinnè, who had no villages when first known to Europeans. Cultivation of the earth was not carried on to the north of the Chippeway country, since maize does not prosper in America beyond the 52nd parallel.

M'Kenney relates that a Chippeway widow must carry a bundle of rags, or a doll, which is called her husband, constantly in her arms, until the relations of the deceased think that she has mourned long enough, when one of them releases her from it. This occurs generally at the expiration of a year, and the widow is then allowed to marry again; but the probation may be extended much longer, if her husband's relations

choose.

The use of the *Uspogan*, or Calumet, which forms so important a part of every ceremony among the Eythinyuwuk, was not an original practice of the 'Tinnè, but was introduced to that people by Europeans along with tobacco, whereas this weed must have been grown from the most ancient times by the Chippeways, if the traditions which Mr. Schoolcraft collected during his long residence with that people are to be trusted. Maize is more used on the Missouri than in the proper Chippeway country, its cultivation forming a part of the regular economy of the Dakota tribes; the Chippeways, however, do not admit that they received it from that quarter; but, in a legend related by Mr. Schoolcraft, ascribe its origin to one of their own chiefs, who received it as the prize of a victory he obtained over a spirit. Hence its name of *Mondamin*, or the Spirit's Grain. The Delawares had extensive fields of maize at the time of the discovery of America, and to them the early Virginian colonists were indebted on their first landing for food, which being afterwards withheld, produced extreme misery and famine.

From some of the details of Mr. Schoolcraft's account of the rites of Kagagishkoda, we may infer that the national polity and social condition of the Chippeways have greatly deteriorated since their acquaintance with Europeans. The contact with civilised man has induced among them an incontrollable desire for intoxication, unaccompanied by any real benefit. For though missionaries have made a number of nominal converts, the blessings of vital Christianity are confined, as far as I could ascertain, to only a few Chippeway communities on Lake Huron, and to some of the Crees in the Hudson's Bay Company's territory. The well-fed *Sauteurs* of the river Winipeg, who are independent of the traders, repel the missionaries; and the same is the case with the bison-hunters on the prairies.

Throughout the whole eastern wooded and barren country, down to the 42nd parallel of latitude, the reindeer was, three centuries ago, the most abundant of the deer kind, and, being the most easily approached, furnished the staple provision for the Eskimo, 'Tinnè, and Eythinyuwuk. On the wide prairies of the Missouri and Saskatchewan, the populous Sioux, Stone-Indians, or Assini-poytŭk, and other Dakota tribes, fed on the countless herds of bison which pasture there. Next to the reindeer in importance in the eastern districts, is the species of *Coregonus*, named

"white-fish," to which the Chippeways and Nithè-wuk have given the figurative appellation of "reindeer of the waters," *Adikumaig* or *Atih-hamēg*.[17] On referring to Strachey's account of Virginia, I do not find this word, nor the name of the reindeer, in his vocabulary of the Delaware tongue; the white-fish indeed not being an inhabitant of the southern waters. The Chippeways have a legend, which relates that the white-fish sprung first into existence at the outlet of Lake Superior, being produced from the scattered brains of a woman, whose head, for some very guilty conduct, was doomed to wander through the country, but, coming in its travels to the falls of St. Mary, was there dashed in pieces. A crane, by virtue of that inherent power so frequently attributed to birds and beasts by the aborigines of America, instantly transformed the particles of brain into the roe of a white-fish, to the wide-spread benefit of the Indian nations.[18]

Though the earth-works already alluded to are supposed to have been raised by a people more ancient than the Eythinyuwuk, yet the fact of their northern limits being within the Chippeway lands is worthy of note; and vestiges of pottery works, apparently of a rude kind, have been found on the south branch of the Saskatchewan within the Nithè-wuk bounds, but not further north[19], the substitute for earthenware among the Eskimos being vessels of potstone, and among the 'Tinnè water-tight baskets, in which the fluid was warmed by hot stones dropped into it.

I have already alluded to the softness and harmony of the Cree language. It differs in construction from the Eskimo tongue, in the personal pronouns being prefixes, not suffixes, and in other particulars; but both have the polysynthetic character of the other American idioms. The sounds of the English *f* and *v* do not occur in the Cree; *l* and *r* are also wanting in the pure Cree of the plains. Other Algic tribes substitute *y*, *n*, or *l* for the Cree *th*, and instead of *k*, the inhabitants of East Maine use the sound of *tch*. The Chippeway is distinguished from the Cree by the frequent omission of *s* before *k* and *t*, and the insertion of *m* before *b*, and of *n* before *d* and *g*. The permutations of the Cree and its cognate dialects chiefly affect the linguals; but the Mohawk and Huron languages have none of the labials, neither *b*, *p*, *f*, *v*, nor *m*. When conversing, the teeth of these people are always visible; the auxiliary office usually

performed by the lips being by them transferred, or superadded, to that of the tongue and throat.[20] Of the grammar of the 'Tinnè I know little, but the nouns seem to be much more frequently monosyllabic than in the Algonkin dialects. The Appendix contains some portions of a Cree vocabulary, which I formed in 1819-20.

It is from among the Eythinyuwuk that most of the servants of the Fur Companies, who have married native women, have selected their wives; few of them having chosen Chepewyan females, and no one, I believe, an Eskimo maiden. From these marriages a large half-breed population has arisen, which will ere long work a change in the fur trade, and in the condition of the whole native population. In character, the half-breeds vary according to their paternity; the descendants of the Orkney labourers, in the employ of the Hudson's Bay Company, being generally steady, provident agriculturists of the Protestant faith; while the children of the Roman Catholic Canadian voyagers have much of the levity and thoughtlessness of their fathers, combined with that inability to resist temptation, which is common to the two races from whence they are sprung. Most of the half-breeds have been settled by the Hudson's Bay Company in the colony of Osnaboya, which extends for fifty miles along the banks of the Red River of Lake Winipeg. Of the six thousand souls, to which the mixed population of this settlement is said to amount, three fifths are stated by Mr. Simpson to be Roman Catholics; while the valuable property is mostly in the hands of the remaining two fifths, who own sixteen out of eighteen wind and water mills, erected within the precincts of the colony.

The settlement is under the government (it can scarcely be said the control) of a governor, council, and recorder, all nominated by the Hudson's Bay Company. The recorder is the civil and criminal judge, presides at jury trials, and is aided by justices of the peace, and a constabulary in the Company's pay.

In 1849 a bishop was sent from England to oversee the Episcopal church. There are also some ministers of the Wesleyan persuasion; and the Roman Catholic worship is maintained by two bishops, a staff of priests, and a nunnery. The Hudson's Bay Company aid the clergymen of all the persuasions by free passages, rations, and other advantages, besides granting salaries to those employed at their fur posts, whether Protestants or Roman Catholics. There are also various educational

establishments in the colony for the settlers and native population; and most of the children, both male and female, of the Company's officers are now instructed in a boarding-school in the colony of a high character, a few of them only being sent to Great Britain or Canada. Many of the young men so educated have entered the Hudson's Bay Company's service as clerks, and some have attained the rank of chief traders and chief factors; while the young women, in their vocations as wives of the officers and clerks, diffuse a knowledge of Christianity and a taste for domestic comfort and decorum to the remotest posts. The present state of society in the fur countries contrasts most favourably with the almost general heathenism which prevailed during the murderous contests between the trading companies by which the country was demoralised when I first traversed it thirty years ago.

The half-breeds, as a class, show great quickness in acquiring a knowledge of letters, as well as skill in the mechanical arts. As joiners, workers in iron, and boat-builders, many of them would rank high among European craftsmen; and, taught by necessity, they have generally the advantage of being able to work at all the several branches of the carpenter's and blacksmith's arts, even to the forging of their tools.

At the Wesleyan Missionary establishment of Rossville, near Norway House, and round the Episcopal church at the Pas on the Saskatchewan, native villages have sprung up, and agriculture to a small extent is practised. Though the cerealia and leguminous vegetables thrive well at Red River, and horses, cattle, hogs, poultry, and sheep flourish, agriculture is eschewed by the large section of the population who are descendants of the Canadian voyagers. The pleasures of the precarious chase are preferred by this part of the community to steady industry, and every summer there is accordingly an extensive movement to the plains to dry bison meat for winter use.

As to the effect of the colony on the neighbouring natives, Mr. Simpson, who from his residence in the settlement had an opportunity of becoming acquainted with the facts, speaks as follows. "Nothing can overcome the insatiable desire of the Indian tribes for intoxicating liquors; and though they are interdicted from the use of spirits, and the settlers are fined when detected in supplying them with ale, yet, from the great extent of the colony, they too often contrive to gratify that debasing inclination, to which they are ready to sacrifice everything they possess. They feel no

gratitude to their benefactors or spiritual teachers; and while they lose the haughty independence of savage life, they acquire at once all the bad qualities of the white man, but are slow indeed in imitating his industry and virtues." It appears from this testimony that the Chippeways have not the friendly feelings towards their instructors which the 'Tinnè, according to Monsieur La Flèche, manifest; but Mr. Simpson speaks more favourably of the Crees, who are in general better disposed than the Chippeways.

Goods for the use of the colonists are imported both by the Company and by individual storekeepers in the ships that come annually to York Factory; but the distance is too great, and the inland navigation too difficult, to admit of agricultural produce being carried down profitably in return. Hence most of the half-breed settlers, encouraged by some of the colonial merchants and Roman Catholic priests, have made strenuous attempts to share the fur trade with the Hudson's Bay Company, who at present have the monopoly of that traffic; and the Company do not seem to possess a force adequate to prevent their eventually succeeding in their object.

Of late years, a communication has been formed between the colony and the United States by way of the plains and St. Peter's River. This furnishes a channel for the disposal of peltry without detection; and through the relationship existing between the half-breeds of the colony and the various tribes of Indians as far north as Methy Portage, no great difficulty is experienced by them in withdrawing a considerable quantity of the most valuable furs from the Company's trade.

In the winter of 1848 a half-breed was summoned before the Recorder of Osnaboya for a breach of the Company's regulations in this respect, and on the day of trial, five hundred of his class, armed to the teeth, surrounded the court-house. The Recorder was obliged to secrete himself, and the matter was finally compromised by the Company's agent purchasing the furs from the delinquent. Secretly or openly, this contravention of the right of exclusive trade in fur claimed by the Company is sure to proceed, and, emboldened by success, the young half-breeds are not likely to acknowledge any law that is contrary to their own will. They hold that the territorial right derived from their Indian ancestry is theirs, and not the Company's; and their claims have been supported by a philanthropic body in England, and advocated in

parliament. Without entering into the question of the chartered rights of the Hudson's Bay Company, or the propriety of maintaining a monopoly of the fur trade, it is my firm conviction, founded on the wide-spread disorder I witnessed in times of competition, that the admission of rival companies or independent traders into these northern districts would accelerate the downfall of the native races. This has been rapid on the confines of the settled parts of the United States and of Canada, and has been stayed only by the extinction of the fur-bearing animals, by which the power of the Indians to purchase spirits has been cramped. Even the benevolence of the English government in making annual presents of clothing and blankets to the Indians of Canada is converted into an injury by a set of unscrupulous petty dealers, who hang about the encampments to purchase these articles as soon as they come into the possession of the Indians, by supplying them with the baneful liquid they so ardently covet. This is punishable by the colonial laws; but when crimes are committed beyond the pale of civilisation, conviction is difficult. By the laws of the United States, also, it is penal to supply Indians with spirits; but according to general report this benevolent enactment is extensively violated by their fur traders; and it is greatly to be regretted that competition for the Indian trade in that quarter should induce the Hudson's Bay Company to follow so bad an example, after having abolished the use of spirits with so much advantage in the north, where they have no rivals.

I was informed that in 1848 the natives at the Red River colony of Osnaboya were paid a high money price for their furs by the Company's agent, and that they immediately crossed the boundary-line to purchase rum at the American post with their money; but it would be better to seek for the redress of such an abuse by a representation to the United States' government, than resort to retaliatory measures of the same nature.

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[5] The *Abenakis*, *Etchemins*, and some kindred tribes located to the south of the Gulf of St. Lawrence, and the *Hochungarras*, or *Winnebagoes*, and *Wyandots*, to the north-west, belonged to the Iroquois stock.

[6] Dr. Latham traces affinities between the terms for "people," in several languages. The similarity of the terms *Inuk* or *Inuit*, and *'Tinnè*, or *'Tinyè*, to some of the above is obvious. Mr. Howes makes *Ethĭn'u* = εθν-ος. From *Ethinu* comes *ethinìseu*, "manly;" "wise," indicating the opinion the Crees have of their own nation.

[7] From *unisha*, "common" or "general," *ininè*, "a man," and *aub*, a generic particle denoting "light," "virility," or "life." Schoolcraft.

[8] This confederacy assumed the appellation of *Mengwè* from the ancient Iroquois title, *Ongwè-honwe*, which signifies, according to Colden, "men surpassing all others."

[9] Called also *Absoroka*. These and the Mandans are the so-called Welch Indians, said to be descended from Madoc and his followers. The same origin has been attributed to the southern *Tuscarora*, of the Iroquois stock.

[10] From *Ni*, "exactly."

[11] Spelt by some Canadian writers *Saulteaux*. A populous Chippeway tribe frequent the Saut Ste. Marie to feed on the *Adikumayg* or *Attikamaig* (White-fish, *Coregonus sapidissimus*, Agassiz), whence the name of "Cascade people" (*sauteurs*).

[12] The following list, drawn up in 1770 by Mr. Hutchins of the Hudson's Bay Service, gives the names of the Eythinyuwuk tribes then trading with the Hudson's Bay Company:—

KEISCATCHEWAN NATION.

Names of Tribes or Places.	Districts they inhabit.
Muska-siskow	Saskatchewan prairies.

Athăpèskow	
Omiska-sipi	Beaver River and Lake.
Pegogĕ-mè-u nipi	Muddy Lake, Moose Lake.
Misi-nipi	Churchill or English River.
Wuskèsew-sipi	Red-deer River.
Po-i-thinnè-kaw-sipi	Nelson or North River.
Pemmichi-ke-mè-u	Cross Lake (Nelson River).
Maskègowuk	Swampy or low grounds near Hudson's Bay.
Ne mè-u sipi	Sturgeon River.
Chuki-tanu sipi	Hill River.
Penesay-wichewan sipi	Hay's River.
Washè-u-sipi	Severn River.
Wewanito-wuk	
Kà-stitchewanuk	Albany River. Here Hudson had his first interview with the natives, among whom traditions of the circumstances attending it were current in 1770.

Naka-we-wuk, or Northern Utawawa.

This people inhabit the country lying between Christianux Lake (Lake Winipeg) and James's Bay, approaching within one hundred miles of the latter. They speak the Odchipewa tongue.

Names of Tribes or Places.	Districts they inhabit.
Namèkusi-sipi	Trout River.
Wà-pusi-sipi	Hare River.
Christianux	Lake Winipeg.
Weniska-sipi	Badger River.

Odchipewè-sipi	River Winipeg.
Mistĕhè-saka-hegen	Great Lake Winipeg.
Mith-kwa-ga mè-u-sipi	Red or Bloody River.
Shama-tawa	Henly House River.

UPE-SHI-POW.

This people resort to the eastern coast of Hudson's Bay, between Rupert's and Whale Rivers. Their language differs in some words both from the Keiskatchewan and Nakawawa. (They border on the Eskimos of the Labrador peninsula.)

Muswà-sipi	Moose River.
Winne-peskowuk	East Main.

La Hontan enumerates the tribes speaking the Algonkin language in 1700 as follows:—

In Acadia (Nova Scotia):—*Abenakis*[12-1]; *Mickemac*; *Canibas*; *Mahingaus*; *Openangos*; *Soccokis* (*Sokokies*, living eastward of Boston, New England—Colden); *Etechemins*.[12-2] These seven tribes are brave warriors, more expert and less cruel than the Iroquois. Their language differs little from the *Algonkin*.

On the St. Lawrence, from the Sea up to Montreal:—*Papinachois*; *Montagnois*; *Gaspesiens*; *Abenakis* of Sciller; *Algonkins*.

On Lake Huron:—*Outaouas*; *Nockes*; *Missisagues*; *Attekamek*; *Outchipoues* (*Odchipewa*), called *Sauteurs*, brave warriors.

On the borders of Lake Ilinois (Lake Michigan):—Some *Ilinois* of Chegakou; *Oumamis*, brave warriors; *Maskoutens*; *Kikapous*, brave warriors; *Outagamis*, brave warriors; *Malomimis*; *Pouteouatamis*; *Ojatinons*, brave warriors; *Sakis*.

On the borders of Lake Frontenac (Lake Ontario):—*Tsonontouans*; *Goyoguans*; *Onontagues*; all of whom speak a language differing

from the Algonkin; *Onnoyoutes* and *Agnies*.

On the Outaouas (Uttawa):—*Tabitibi*; *Monzoni*; *Machakandibi*; *Nopemin* of Achirini; *Nepisirini*; *Temiskamnik* (Lake Temiscamaing). These six tribes speak Algonkin, and are all cowards.

On the north of the Mississippi, and in the country bordering on Lake Superior and Hudson's Bay:—*Sonhaskitons*; *Ouadbatons*; *Atintons*; *Clistinos*, brave and skilful warriors.

The *Assimpouals* (*Assinipoytuk*, or Stone Indians) and Eskimaux are struck out from La Hontan's list, as they belong to other nations. The chart appended to his book gives the positions he assigns to these several tribes; but Schoolcraft whose authority is of the greatest weight, says that the list contains many errors. The chart, of course, has all the imperfections which attached to the geography of the great lakes and more northern country then, and for more than a century afterwards.

[12-1] This tribe are of the Iroquois stock, according to Schoolcraft, who says that *Abenaki* is a derivative from *Wabanung*, "the east," and *ahkè*, "earth," and signifies "eastlanders." The *Abenakis* were called Tarrenteens by the early English colonists, and formerly inhabited part of the present states of Maine and New Hampshire. They were divided into several sub-tribes, of whom the best known are the *Penobscots*, *Norridgewocks*, and *Ameriscoggins*. About the year 1754, all but the Penobscots withdrew into Canada. The fullest vocabulary of the Abenaki language is furnished by the manuscripts of Father Rale, and has been published by the American Academy of Arts and Sciences. The language is peculiar, from the frequent use of the rolling sound of *r*, or a burr.

[12-2] The *Etchemins* are of the Iroquois race, according

to Schoolcraft.

[13] A society named *Wabuno* is said to have been formed among the Chippeways, for the practice of certain nocturnal orgies called *Wabunsi*,—an appellation signifying "not yet light," from *wauben*, "daylight," and the negative suffix.—See Schoolcraft. The appellation of *Wahunsenacawh*, by which Powhattan's subjects were accustomed to address him, had probably reference to his being chief of a society of this kind. (See Virginia by Strachey.)

[14] *Wĭggè* or *Wigwap* signifies a dwelling. Most of the Indian words and names of places adopted into the languages of the United States and Canada are of Algic origin. The Mandans and other Dakotas of the Missouri build more substantial huts, with dome-shaped roofs, covered with earth, to which, as to look-out places, the men resort.

[15] Or *Gepuchikan*. The propensities as well as designation of this being resemble those of "Puck." Dr. Johnson derives the latter word and Pug, from the Icelandic and Gothic word *Puke*, signifying "a hobgoblin."

[16] From *Ka-gi-gi*, "everlasting," and *iskōda*, "fire." The corresponding words in Cree are *kā-ki-ki* and *iscu-teyu*.

[17] *Adikumaig*, from *adik*, a "reindeer," and *guma*, a generic word for "water" in composition, and the animate plural *ig*. (Schoolcraft.) *Athik* or *atik*, "a reindeer," in Cree.

[18] Schoolcraft.

[19] On the east side of the Rocky Mountains. The Eskimos on the western coast of Russian America manufactured a very rude pottery when first visited by the Russians.

[20] Mr. Howse, from whose grammar much of this paragraph has been borrowed.

CHAP. XV.
OCCURRENCES IN WINTER.

FORT CONFIDENCE.—SITUATION.—SILURIAN LIMESTONE.—LAKE BASIN.—TREES.—DWELLING-HOUSE.—OCCUPATIONS.—LETTERS.—GALENA NEWSPAPER.—OREGON "SPECTATOR."—EXTENT OF THE HUDSON'S BAY COMPANY'S TERRITORY.—FISHERIES.—VENISON.—WOLVERINES.—NATIVE SOCIALISM.—PROVISIONS COLLECTED AT FORT CONFIDENCE.—FETES.—WINTER FISHERY.—ESKIMO SLEDS.—REINDEER.—WOLVERINE.—WOLVES.—HONESTY OF THE DOG-RIBS.—THEIR INDOLENCE.—PROVISIONS NOT INDIVIDUAL PROPERTY.—INDIANS MOVE OFF.—AN ACCOUCHEMENT.—CŒLEBS IN SEARCH OF A WIFE.—MIGHT MAKES RIGHT.—NONE BUT THE BRAVE DESERVE THE FAIR.—PROGRESS OF THE SEASONS.—TEMPERATURE.—ARRIVAL OF SUMMER BIRDS.—AT FORT CONFIDENCE.—AT FORT FRANKLIN.—ON THE YUKON.

The site selected for our winter residence was about three miles from the mouth of Dease River, on a peninsula having an undulating surface, which, at the distance of three or four miles from the lake, attained a height of about three hundred feet. In front, or to the south, and separated from the main by a strait five or six hundred yards in width, lies Fishery Island, elevated towards its centre two hundred and forty-five feet above the water.[21]

The peninsula is composed of limestone, which forms low precipices at the edge of the water, as well as in various places of the interior; and the same rock appears in higher cliffs on the borders of the lake, about eight miles to the westward, at Limestone Point. Six or seven miles back, on the banks of Dease River, red sandstone is the prevailing rock. The soil generally is a mixture of gravel and loam; and boulders of granite and

trap rocks are scattered over the surface of both hill and valley.

Ten miles to the eastward, a range of primitive rocks rises gradually from the borders of the lake, to the height of, perhaps, six hundred or seven hundred feet, and separates Dease's Bay from the northern arm of M'Tavish's Bay. This rising ground is a continuation of the "intermediate primitive belt" mentioned in p. 316, and many other parts of the preceding journal, and which will be described more fully in the Appendix. The nearest pyrogenous or metamorphic rocks to Fort Confidence that we observed are about four miles off, in a bay on the south-east side of Fishery Island.

The limestone is probably the remains of the silurian strata, which were removed when the basin of the lake was excavated. On the south side of the lake, about ninety miles distant in a direct line from Fort Confidence, stands the Scented Grass Hill, between Smith's and Keith's Bays. It consists of bituminous shale, and is one of the extreme points of that shaly formation, which constitutes so large a part of the banks of the Athabasca and Mackenzie Rivers, and which has been thought to be equivalent to the Marcellus shale of the New York system of rocks.

The summits of the higher eminences are mostly naked, but on the edges of streams and small lakes a thin forest of spruce fir covers the ground. In wet places there is a tolerable growth of willows. Little underwood of any other kind exists. Birch is very scarce; neither the balsam spruce nor banksian pine were observed on the lake, and only a few young aspens. Except where the forest has been destroyed by fire, the spruce firs are from three to four hundred years old, as ascertained from their annual rings. One of the best-grown trees that I saw, measured fifty-seven inches in circumference, at the height of four feet from the ground. The tallest of them are between forty and fifty feet high.

The observations of Mr. Simpson in 1837-8 place Fort Confidence in 66° 54′ of north latitude, and 118° 49′ of west longitude, which corresponds pretty closely with the position I assigned to the mouth of Dease River on the chart constructed in 1825. The mean of Mr. Rae's observations for latitude gave about a quarter of a mile more northing than Mr. Simpson's.

Our winter dwelling, though dignified, according to custom, by the title of "the fort," had no defensive works whatever, not even the stockade which usually surrounds a trading post. It was a simple log-

house, built of trunks of trees laid over one another, and morticed into the upright posts of the corners, doorways, and windows. The roof had considerable slope: it was formed of slender trees laid closely side by side, resting at the top on a ridge pole, and covered with loam to the depth of six or eight inches. A man, standing on the outside, could touch the eaves with his hand. Well-tempered loam or clay was beat into the spaces left in the walls by the roundness of the logs, both on the outside and inside, and as this cracked in drying, it was repeatedly coated over, for the space of two months, with a thin mixture of clay and water, until the walls became nearly impervious to the air. The rooms were floored and ceiled with deal. Massive structures of boulder stones and loam formed the chimney-stacks, and the capacious fire-places required three or four armfuls of fire-wood, cut into billets three feet long, to fill them.

The building was forty feet long by fourteen wide, having a dining-hall in the centre, measuring sixteen by fourteen, and the remaining space divided into a store-room and three sleeping apartments. A kitchen was added to the back of the house, and a small porch to the front. Mr. Rae's room and mine had glazed windows, glass for the purpose having been brought up from York Factory. The other windows were closed with deerskin parchment, which admitted a subdued light. Two houses for the men stood on the east, and a storehouse on the west, the whole forming three sides of a square, which opened to the south. The tallest and straightest tree that could be discovered within a circuit of three miles was brought in, and, being properly dressed, was planted in the square for a flag-post; and near it a small observatory was built, for holding magnetic instruments.

Of the buildings which Dease and Simpson erected, Mr. Bell, on his arrival in the middle of August, found only part of the men's house and a stack of chimneys standing; the others having, through the carelessness of the Indians, been destroyed by fire. Our predecessors had cut down most of the timber within a mile of the house, and what we needed had consequently to be brought in from a wider circle. A part of Mr. Bell's people were constantly engaged with the fisheries, but the others had worked so diligently, that the buildings were all covered in on our arrival, and the flooring, ceiling, and partitions were shortly afterwards completed. Two of the sappers and miners, Mackay and Brodie, carpenters by trade, were employed to make tables and chairs; and

Bruce, the guide, acted as general architect, and was able and willing to execute any kind of joiner's work that was needed. Two men were constantly employed as sawyers; four as cutters of fire-wood, each of them having an allotted task of providing a cord of wood daily; others were occupied in drawing it home on sledges; and four men were continually engaged in fishing. On the Sunday no labour was performed, the fishing party came in, and all were dressed in their best clothes. Prayers were said in the hall, and a sermon read to all that understood English; and some of the Canadians, though they were Roman Catholics, usually attended. James and Thomas Hope, who were Cree Indians, having been educated at Norway House as Protestants, and taught to read and write, were regular attendants; and James Hope's eldest son, a boy about seven years of age, who had already begun to read the Scriptures, frequently recognised passages in the lessons that he had previously read.

During the winter Mr. Rae and I recorded the temperatures hourly, sixteen or seventeen times a day; also the height of the mercury in Delcro's barometer; the degrees of the aneroid barometer, the declinometer, and dipping-needle. Once in the month a term day, extending to thirty-six hours, was kept, in which the fluctuations of the magnets were noted every two and a half minutes, and various series of observations were made for ascertaining the magnetic intensity with the magnetometer, the vibration apparatus, and Lloyd's dipping-needle. Mr. Rae ascertained frequently the time and rates of the chronometers by observations of the fixed stars; and a register of the winds and weather and appearances of the aurora was constantly kept.[22]

From this sketch of our occupations, it will be seen that our time was filled up, and that we had no leisure for ennui in the long winter. In fact, we enjoyed as much comfort as we could reasonably expect, and had our postal arrangements succeeded as well as the others, we should have had little more to desire. Our schemes for sending and receiving letters were, however, failures, and productive of much subsequent disappointment.

The packet of Admiralty despatches and private letters sent off on the 18th of September, 1848, on the third morning after our arrival from the coast, was placed in charge of François Chartier and Louis la Ronde, with directions for them to proceed with all speed to Isle à la Crosse, at

which place Chartier's wife was residing. I wrote to Mr. M'Pherson, requesting him to forward the party without delay; and Mr. Rae, who put up the packet, enclosed, I believe, a circular, soliciting the gentlemen at the several posts to send the packet on as quickly as possible. Mr. Rae himself was of opinion that he enclosed such a document, though he does not perfectly recollect that he did so. But whether the circular was enclosed or not in the first instance, or afterwards left out, the circumstance of a packet being sent express for fifteen hundred miles ought to have ensured its being forwarded from the further posts. No delay occurred at Fort Simpson, Mr. M'Pherson sending the party on as soon as their provisions could be prepared. Chartier and his companion reached Fort Chepewyan by open water, and were despatched to Isle à la Crosse as soon as the ice was strong enough for travelling over. At Isle à la Crosse the letters were put *en route* again after a fortnight's detention, and at Carlton House they were kept two months. This last delay was unaccountable. When they did reach Red River they were sent on; but instead of reaching England in April or May, as we had a right to expect, and when a knowledge of our proceedings was much desired by the Admiralty previous to the sailing of the "North Star," they did not arrive till the middle of July, and our families were nearly twelve months without intelligence from us. We were also unfortunate with our subsequent letters, which were not, however, sent by special express, but were left to the chance of the ordinary conveyance through Rupert's Land.

On the 31st of October, two men and an Indian guide were sent with a second packet of letters to Fort Simpson, hoping that they would be in time for an express which leaves that post annually for the south on the 1st of December. The Indian lost himself, or rather, I believe, went wilfully astray, for the purpose of falling in with some hunters that he expected to find. In this he failed; and the party, after suffering some privations, were saved from starvation by killing a deer. They did not reach Fort Simpson till some time after the winter express had left; and as the letters were not of public importance they remained there until the spring, when they were forwarded along with some others that we subsequently sent to Fort Chepewyan, that they might go down with the first boats. On my way out in the summer, finding part of these letters at one of the posts, I took them on with me; the others reached England by

the same mail packet that I crossed the Atlantic in, and were delivered on the day after my arrival at home.

The only letter-bag from England that we received during our stay at Fort Confidence came in on the 12th of April, 1849, and brought us home news up to the 22nd of June, 1848, ten months old. This came by the usual canoe route, and was brought up from Canada with the Red River mail; but at the same time we received a single newspaper, which gave us some English intelligence as late as the 15th of September. The history of this newspaper is that of the triumph of the electric telegraph. While the English mail packet was steaming up the sound of New York, on the 30th of September, a summary of European news having been carried on shore by an express steam-vessel, was in the act of being transmitted by telegraph to the banks of the Mississippi. Within a few hours, it was published there in the "Galena Advertiser," of which it filled one entire folio. This paper, being carried over the plains to Red River, by a party which set out on the day following its publication, was sent to Great Bear Lake, and gave us the first intimation of a rebellion in Ireland. The other newspapers that we received at the same time were of very old date, but every paragraph of them, as well as of our letters, was read again and again with a keenness that can be understood only by those who have undergone similar privations of intelligence. We heard of an old resident in Rupert's Land, who was philosophic enough to extend this pleasure over the whole year, by laying up his annual file of newspapers, and taking one down daily for perusal according to its date, so that he had just mastered the news of the preceding year when a new file arrived. Our impatience was too great to permit us to follow an example so systematic.

By the return of our packet men from Fort Simpson in January, we received the Oregon "Spectator," dated Oregon city, February 10th, 1848, with the motto "Westward the star of Empire takes its way." It was a creditable production for so young a state, remarkable for the extreme dearth of "news," but a strenuous advocate of temperance and morality, and curious for the insight which it gave of the first movements of a community destined at no distant period to play a conspicuous part among the nations of the world. The state is already involved in an Indian war, which will not cease until the Red Men are hunted from their native soil. The cause of hostility was one of those unavoidable accidents which

the vicinity of white people entails on the Indian race. A large body of emigrants brought smallpox and measles with them, which, spreading among the populous and warlike Kaiyuses or Black-feet, cut off many of the tribe. By the Indian moral code, the death of their brethren was to be revenged by the slaughter of people from whom the injury came, and as it was sufficient if the victims were of the same nation with the offenders, the Kaiyuses fell upon the nearest and most defenceless. A missionary and his family, to the number of twelve persons, were cut off, and their property and some women and children seized. Through the interference of the Hudson's Bay Company's Governor at Fort Vancouver, the captives were redeemed, but five hundred of the inhabitants of Oregon marched to chastise the Indians. The paper says, "the thunders of war have commenced; let them be continued until American property and American life shall be secure upon *American soil*." We afterwards learnt that the demonstration had little effect upon the Indians, who, being well provided with horses, shunned the encounter, or returned to harass the Oregon army at their pleasure. Sooner or later, however, the Kaiyuses will feel the strong arm of the white man, and be compelled to cede their native lands to the emigrant hordes that are pressing westward.

As the crow flies the distance between Fort Vancouver on the Oregon and Fort Confidence exceeds 1350 geographical miles, and the space between the Company's posts on the Labrador coast, or on Lake Huron, and their advanced station on the Porcupine, measures about 2500 miles. Throughout this vast extent of territory, a regular communication is kept up between the Governor and the numerous scattered posts, and supplies are forwarded to all the districts annually with a regularity which cannot be interrupted without hazarding the lives of both traders and natives. Besides the establishment of fisheries for our winter support, Mr. Bell employed several of the most active Dog-ribs in the capacity of fort hunters, furnishing them with clothing, guns, and ammunition, to be repaid in venison. He also gave large credits of ammunition and other articles of trade to several leaders of small bands for the same object. In the end of September and in October, which is the best hunting season, we heard of great success. Two hundred carcases of rein-deer were reported as having been put *en cache* for us, which we were to send for as soon as the snow was sufficiently deep to permit the dog-sledges to run. A few animals killed near the fort were

brought in, and our prospects looked flourishing. In the mean time the Indians sent a sick man and a very aged woman to be nourished by us through the winter, and a large body of old men, elderly widows, and children settled down near us at a fishing station behind Fishery Island. From this body visitors came to us almost daily, begging for a meal or two of dried meat to vary their diet, or bringing in a trout or two for sale. The fish were always purchased, and then the seller invariably asked for a bit of meat, as he could not walk back without eating. The simple cunning by which these poor folks endeavoured to accomplish their ends, and to move Mr. Bell to be liberal, was amusing, and generally in the end successful, for his habitual good-nature was not long proof against their varied entreaties.

In the first two weeks of October, the ice driving about compelled the fishermen to take the nets out of the water, and during that time the Indian party subsisted mostly on rations from us, being supplied with both meat and fish. As soon as the straits separating Fishery Island from the main froze completely over, which occurred on the 16th of the same month, the old men were well supplied with trout-hooks to set under the ice, and they caught, I believe, fish enough for their wants, but they concealed their success that they might continue to draw aid from our store. By dint of much talking, occasionally withholding supplies, and threatening to do so entirely, Mr. Bell at length persuaded most of the party to move towards Cape M'Donald, where fish were reported to be more plentiful. Our own fisheries, however, as well as the Indian ones, declined as the winter wore on, and in February scarcely sufficed to furnish a meal daily to the fishermen themselves.

The snow having by the middle of October smoothed the inequalities of the surface, and covered the stones and stumps, Mr. Bell sent out parties to bring in the venison that had been stored up for us; but instead thereof we received, a very beggarly account of empty *caches*. The wolverenes had destroyed some; our Indian friends at the fishery had eaten up a greater quantity, having, unknown to us, made several excursions for the purpose; and we did not take into the storehouse a tithe of what had been reported to us. The hunters by whom the *caches* had been made came in for fresh supplies of ammunition, and, on being remonstrated with, merely said, what could they do if hungry Indians came their way? they must eat. This socialist practice presses heavily on

the industrious hunter, and encourages the lazy individuals in their idleness; but its continuance in force after so long an intercourse with white men is a proof of a fund of good-nature at the bottom of the national character. It is of itself sufficient evidence against the imputation that the Chepewyan tribes habitually desert the old and infirm. We saw on several occasions children attending their sick or aged parents with tenderness and solicitude. Instances of desertion, which have undoubtedly occurred, are to be ascribed to the pressure of famine, which has urged the able-bodied to hurry on in quest of relief, disregarding those who were unable to keep up with the line of march.

Our intercourse with the Indians continued throughout the winter in the way that has been stated. The more industrious among them resorted to good hunting stations, generally in parties of two or three families together, and also in two more numerous bands, under the direction of two chiefs. Most of them resorted to the confines of M'Tavish's Bay, where the animals are plentiful in winter. From them we received occasional supplies of venison, and two or four of our men were employed for a considerable part of the winter in bringing it in with the dog-sledges. From two steady old men, who had been furnished with nets, we purchased some hundreds of fine trout, together with a quantity of white-fish and freshwater herrings. Some of the Martin Lake Dog-ribs also, though not fitted out by us with ammunition, found it convenient to bring their meat to Fort Confidence, instead of going to Fort Simpson. In this way we obtained more than we required for our present and future wants, including the eleemosynary demands of the Indians, which were, however, kept within bounds by Mr. Bell's careful management.

The following table, extracted from Mr. Bell's journal, gives a summary of all the provisions received into our storehouse up to the middle of April, 1849:—

Months.	No. of Fish.	Fresh Venison.	Half dry Venison.	Pounded Meat.	Reindeer Fat.	Reindeer Tongues.
		lbs.	*lbs.*	*lbs.*	*lbs.*	*No.*
1848 September	420	500	1500	200	150	120
October	2370	130	2100		170	105
November	1163	4330	570		18	65

December	560	1830	140			10
1849 January	279	2005				
February	223	1850	560			40
March	176	3165	1680	105	10	125
April			2670	55	5	160
Totals	5191	13,810	9,220	360	353	625

In addition to the above, Mr. Bell brought up, in autumn, 1200 lbs. of dried meat from Fort Simpson, 6 cwt. of barley-meal, and three kegs of rough barley, several 90 lb. bags of flour, some bags of potatoes, with tea and sugar, together with a full supply of pemican for Mr. Rae's summer expedition, and for the provisioning of the men returning to England.

So well provided, we had no dread of want at any time, and passed the winter in abundance. Our men had each a daily ration of 8 lbs. of venison on five days in the week, and on the other two from 10 lbs. to 15 lbs. of fish. The women also received rations, and the children smaller allowances. Barley and potatoes were issued in addition as long as they lasted, and flour occasionally. All the men preferred barley-meal to wheaten flour, as it answered better for thickening the soup, and they thought that it was a more substantial article of diet. The rough barley was beaten in a wooden trough until the husks separated, and then boiled whole along with venison, in which way it made a nourishing soup, that was much relished by all the party. Few of the Europeans consumed the whole of their provisions, and the Indians were generally in attendance at their meals to receive the surplus. Several feasts varied the monotony of our winter life: one was given as a house-warming when the buildings were finished; another, as is customary at all the posts, on the first day of the new year; and two others when the winter was further advanced. On these occasions, the fishermen and wood-cutters were called in, and the whole establishment, man, woman, and child, supped at long tables placed temporarily in the hall. Preparations for the feasts were made by a great baking of bread, pies, and tarts[23] for two days previously; and tea was served liberally as long as any of the party felt an inclination to drink. The tables were then cleared away, and the dance was kept up with vigour to a late hour, or rather to an early one, for the party did not separate till the morning was advanced. Mr. Bell and Bruce were the

musicians. The latter, with that aptness which the half-breeds show to learn any thing that comes under their observation, had made his own fiddle, and taught himself to play upon it.

A short description of the modes of fishery by which most of the fur posts in Rupert's Land are supported may not be inappropriate in this place. The nets, formed like those used in the herring fishery, measure, before mounting, one hundred and twenty yards in length, but are gathered in to eighty yards by the introduction of the backing-line along the upper edge. The depth of the net varies with that of the waters in which it is to be employed, from two to four yards. For the capture of white-fish, of the ordinary size of three or four pounds, the mesh is five and a half inches long, and where these fish are very large it is increased to six. For taking the Bear Lake herring, and the small *coregoni* of other localities, the meshes vary from two inches to two and three quarters. In open waters the nets are shot, as in the herring fishery; the upper margin being buoyed with cedar or fir floats, and the lower one depressed by stones. The fish hang themselves in the meshes, being unable, from the form of the gill-plates, to withdraw their heads after having once passed them through. Trout of 15 lbs. weight may be taken in the white-fish nets, and also *inconnu* (*Salmo mackenzii*) weighing 25 lbs.; but the meshes will not admit the heads of the larger trouts (*namay-cush*), which weigh from 30 lbs. to 50 lbs. These are caught with cod-hooks.

In winter the nets are set under the ice. The first step is to make a series of holes, about fifteen feet apart. A pole is then introduced, and conducted along the surface of the water from hole to hole, carrying with it a line, which serves to haul in a string of nets, properly buoyed and loaded, but seldom exceeding five in number. The rope is then detached, and each end of the net is fastened to a piece of wood, laid across its respective hole, or to a stake driven into the ice. On visiting the nets next day only the extreme holes are opened, the rope is attached anew at one end, and is veered away as the nets are withdrawn by the opposite hole. The fish that have been caught being removed, the nets are drawn back to their places by the line. A line of nets reaches about 400 yards, and the fisherman generally endeavours to carry it entirely across a strait or pass in the lake which fish are known to frequent.

Every second or third day, fishermen who are careful take their nets out of the water to dry and repair them. If this be not attended to, the

threads swell and rot and few fish enter the meshes; the floats also become water-logged if not often dried. In severe weather, the fisherman erects a canvass or skin screen to windward, to shelter him while he overhauls his nets. Eskimo snow barricades are much more effective, but pride will not permit the Orkney or Canadian fisherman to turn the useful expedients of the Eskimos to account.

In the winter, Albert built a snow wall very neatly round the water-hole by which the fort was supplied, to keep off the snow drifts, cut steps through the ice down to the water, and then fitted to the aperture a light snow-lid, that could be easily removed. By this contrivance the water-hole required little clearing for a week, and the convenience was great; but after the first admiration of his ingenuity subsided, the cover was thrown aside, and the hole allowed to fill up with snow-drift. The consequence of this neglect was, that the first man or woman who went for water in the morning had half an hour's hard work to procure it, and then it was necessary to remove all the impurities left by the dogs which had resorted there to drink on the preceding day.

Albert found more ready imitators in another practice which he taught the men. He was appointed to attend to the officers' fires, and immediately set about preparing his wood sledge according to his own fashion. He first coated the runners with earth or clay tempered with water, coat after coat freezing as rapidly as it was applied. Hot water was used in this operation, otherwise it would have frozen too quickly for him to give it the convex form and smoothness that were necessary. He next washed the runners with water, polishing the ice with his naked hand as it formed. Canadians and Europeans looked on carelessly, merely saying to one another, "What can the savage be about?" but none of them having the most distant idea that they would follow his example next day. The four sledges employed by the woodmen were of equal size, and each was drawn by two men. The drawers of wood went out together, were equally loaded, and, to their extreme surprise, Albert and his companion outstripped them all on the journey home; their emulation was excited, they laboured hard the whole day, and at night confessed that they were fairly beaten. Then they tried Albert's sledge, and found it run so easily, that forthwith they requested him to prepare their sledges in the same way; and during the winter the sledge-men invariably dressed their runners in the Eskimo mode.

The venison that we obtained was the flesh of the small or barren ground rein-deer, which drops its young on the coasts or islands of the Arctic Sea. This kind does not penetrate far into the forest even in severe seasons, but prefers keeping in the isolated clumps or thin woods that grow on the skirts of the barren grounds, making excursions into the latter in fine weather. A full grown well-fed buck seldom weighs more than 150lbs. after the intestines are removed. The bucks of the larger kind, which were mentioned in a preceding chapter as frequenting the spurs of the Rocky Mountains near the Arctic Circle, weigh from 200 lbs. to 300 lbs., also without the intestines. Whether these be the same with the woodland rein-deer, which inhabit the southern districts of Rupert's Land and the adjoining parts of Canada, and of the United States, has not been determined, no comparisons having been instituted. The small barren ground deer are generally in excellent condition in the proper season, and yield the very finest venison, hence they can scarcely be supposed to have been dwarfed through defective pasture; and it is probable that a rigid comparison of examples of the several kinds would elicit specific differences. The rein-deer that visit Hudson's Bay travel southwards towards James' Bay in spring. In the year 1833, vast numbers of them were killed by the Cree Indians at a noted pass three or four days march above York Factory. They were on their return northwards, and were crossing Hayes River in incredible multitudes. The Indians, excited by the view of so many animals thronging into the river, committed the most unwarrantable slaughter; man, woman, and child rushed into the water and stabbed the poor deer wantonly, letting most of the carcases float down the stream or putrefy on the beach, for they could use only a small number of those they slew. From that date the deer did not use the pass until last year, when a few resumed their old route and were suffered to go unmolested, the Indians not being prepared for their coming. Mr. Rae made two successful excursions in search of deer in the winter, and the Hopes likewise went a short way into the barren grounds on the same errand, but though the latter also killed animals, their *caches* being carelessly made, were invaded by the wolverenes, and our store reaped no advantage from their efforts. The wolverene is extremely wary, and shows extraordinary sagacity and perseverance in accomplishing its ends. The Indians believe that it is inspired with a spirit of mischief, and endowed with preternatural

powers. Though more destructive to their hoards of provision than the wolf, or even the bear, and able to penetrate fences that resist their powerful efforts, it is only about thirty inches long, a foot high at the shoulder, and one foot six inches at the rump, but it is very compactly made.[24] With teeth that do not seem to be peculiarly fitted for cutting wood, it will sever a log equal to a man's thigh in thickness by constant gnawing. In selecting the spot it intends to breach it shows as much skill as the beaver, generally contriving to cut a log near one end, so that it may fall down into some void space, and thus open an entrance into the hoard. The animal works so hard in carrying on this operation that it causes its mouth to bleed, as the ends of the logs and the snow often testify. Once admitted into the hoard, it has to gnaw the pieces of meat asunder, as they are generally frozen together, and then it proceeds to drag them out one by one, and to bury them in the snow, each in a separate place. As it travels backwards and forwards over the meat, it smears it with a peculiarly fetid glandular secretion, after which no other animal will touch it. In this way one of these beasts will spoil a large *cache* in an hour or two, and wholly empty it in a few nights. The pieces which are carried off are so carefully concealed in the snow, and the wolverene makes so many tracks in the neighbourhood, that it is difficult to trace out the deposits, and they are seldom found.

Where there are trees, the meat *caches* are generally made with logs let into each other at the corners by notches, as in building a log-house. This, as we have seen, can be invaded by the wolverene. Mr. Rae, however, made a safe cellar by cutting a hole in the ice, covering it thickly with snow, and then pouring water over all, until the frost had rendered the whole a solid mass.

Wolves also follow the hunter, and lurk in his neighbourhood, to share in the produce of his gun. Their strength enables them to break occasionally into a *cache*, but they have neither the skill nor the tenacity of purpose of the wolverene, and the damage they commit is generally on the carcases of deer recently slain, while the hunter has gone for a sledge to bring them in. On his return in an hour or two he often finds only the well picked bones. These wolves, though of large size, are a timid race, and seldom or never exhibit the ferocity and ravenous boldness of their Pyrenean brethren. When reduced by famine they are very abject and unresisting. Mr. Bell once, while residing on Mackenzie's River, caught a

full-grown but famished wolf in a marten-trap tied to a small log, which it had not strength to carry away. He went to the fort for a line to lead it home, and the children who accompanied him back assisted in bringing it in, by pushing it on from behind. It made no resistance, and suffered itself to be tied quietly to the stockades of the fort. The experiment of taming it was not, however, made, and after the curiosity of the people was satisfied, it was killed. At another time, a wolf, driven by hunger, was prowling about Fort Edmonton, when, being scared by some of the people who were passing, it took shelter in the kitchen. The cook, an old Canadian, who was busily engaged in frying pancakes, was frightened by the aspect of his visitor, and oversetting the frying-pan in the fire, and leaping into bed, he hid himself beneath the blankets. The poor wolf, astonished at the novelty of the scene, and amazed by the blaze of the flaming grease and the screams that issued from the bed, retreated into the square of the fort, and was there killed by the people who had rushed from their several houses on the alarm being raised.

One of Mr. Rae's hunting and exploring excursions was made in the month of December, in the coldest period of the winter; and he informed me that at that time the vapour which rose from the rein-deer completely hid the individuals of a herd; so that, unless he could approach a detached one, or get into the midst of them, he could not take an aim.

Notwithstanding the indolence of a large part of the Dog-rib and Hare Indians who resorted to Fort Confidence, and their total disregard of truth, they had the merit of being strictly honest with respect to property, and also of being quiet and unwilling to offend. No precautions were taken to guard knives and other articles used in the house to which they had easy access, but they meddled with nothing, and we missed none of our effects. The thermometers, of which at least a dozen were constantly hanging up outside, were never touched, and none of the natives ever intruded into the magnetic observatory, after a general intimation that they were not to do so. When parties of them came in with venison, they slept in our dining-hall, and their friends from the fishery joined them to hear the news, and to talk for a great part of the night, yet, though the place was crowded, they gave us very little trouble. Some of the new comers would frequently enter the sleeping apartments, and crouching down against the wall, remain in perfect quietness for an hour together, gazing at the books and other things exposed to view, and

watching Mr. Rae and myself writing.

In December, January, and February, the Indians pressed heavily on our store, as the fishery was at a low ebb, and they had either consumed, or we had brought in, all the venison that had been put *en cache* for us. The more active hunters, with their families, had followed the game to a greater distance, and several detachments of stout but idle young men had joined the fishery encampment. From these able-bodied fellows we steadily withheld rations, though they were more than once furnished with provisions and ammunition to go out on a hunting excursion. The efforts to get them to do any thing were, however, ineffectual. They generally returned when their food was exhausted, saying that the animals were all gone. They were afraid, I believe, to venture far in the proper direction, lest they should meet enemies of whom they are in constant dread, and especially of their spiritual foes. Their complaints of the want of game were, however, proved to be unfounded, by the excursions of Mr. Rae and the two Hopes.

In January, intelligence came that the hunters had stored up a number of deer at a considerable distance from the fort, but the news reached Cape Macdonald as soon as Fort Confidence, and a party from the fishery set off in quest of it. They were, nevertheless, too late, some of their wandering countrymen having discovered and consumed the store before their arrival, and they were compelled to return, in a famishing condition, to the fishery. Our men had also a fruitless journey to the empty *cache*. The lies that were told on these occasions were innumerable, and every one was ready to clear himself and inculpate some other party. We generally, however, succeeded after a time in finding out the real delinquents, who consequently were coolly received, and had short rations when they came to the fort.

As the months of February and March rolled away, and the days lengthened, cheering reports from the hunting parties came in, and some of the more active of the fishery party went to join them. Mr. Bell, on two several occasions, fitted out the whole of the residents at Cape Macdonald with provisions enough to take them to the hunting stations; but their hearts failing them, they consumed what was given to them, and came with their daily petitions as before. During this time they were taking trout, and denying that they did so, though they occasionally sold us a few. At length, towards the end of March, two of our fort hunters,

who had left their wives at the fishery, coming to fetch them, the desire of the whole party to eat venison became uncontrollable, and they came in *en masse* to the fort, with their sledges and all their moveables, to receive another fit out. They remained encamped near the house on this occasion for about three weeks before they took their departure, subsisting chiefly on the produce of their trout lines. During this time some of the young men made two excursions to plunder the *caches* of the hunters employed by us, but were foiled in the attempt, and came back fasting; for Mr. Bell, taught by former losses, had been very prompt in sending men for the venison, and had secured it before the marauders reached the spot.

At this time some considerable supplies were brought in by the Martin Lake Indians, and we had several opportunities of observing the way in which these people act towards each in regard to provisions. The venison intended for us was neatly packed on the sledges, but each Indian generally carried a kind of knapsack on his shoulders, containing some choice pieces of meat to be consumed on the journey back to his tent. The sharp eyes of the hungry party at the encampment discovered the approach of strangers while yet at a great distance, and the rumour of an arrival spreading with rapidity, men, women and children crowded into the square of the fort. The first act of the new-comers was to run the loaded sledges at once into the store-house, which was opened to receive them; but as they arrived in succession, the women from the camp generally pressed in, and throwing their arms round a young hunter, with much kindness of manner would say to him, "It is long since we have seen you, my relation; how have you fared since we met? You are a generous man!" and so on. While his attention was thus engaged, and before he could free himself from the unwashed sirens, whose unwonted softness of speech led him to suspect either ridicule or plunder, one of the females having cut the strings of his knapsack would carry it off, amidst the laughter of the crowd. The young fellow, thus despoiled of his provisions, however much he might be vexed in secret, was obliged to join openly in the mirth; and the expression of face of some of the youths thus preyed upon, as they endeavoured to force a smile in their distress, was irresistibly comic. The loss fell ultimately on the store, as Mr. Bell had to furnish the party with food for their return, though in that case he did not certainly select titbits. When at length the great move was made,

and the fishery party, exceeding forty in number, went off, in the end of March news came that the wife of one of the hunters, a very small woman, had been taken with the pains of labour. The three females belonging to the fort went to her aid, and found the new-born infant, the mother's first child, wrapped in a deer's skin and stuck into a hole made in the snow. It was brought into the house, and dressed by the fire. This event delayed the mother's departure about two hours. She then set out dragging a sledge, and having her first-born suspended between her shoulders, in a bag or Indian cradle. She was not suffered, however, to profit by the well-beaten path pursued by the rest of the party, who had gone before her, but had to make a new track parallel to it through the loose snow, always a laborious task, even to a stout man. Want of success in hunting, or some other calamity, was sure to befal an Indian who should incautiously tread in her footsteps. This was the custom; no slight or unkindness was shown to her; her husband was, I believe, really fond of her; and her sledge was a light one, being loaded only with things belonging to herself.

Soon after what may be considered a great event in the simple annals of Fort Confidence—the departure of so numerous a body of hangers-on—we had a visit from a Dog-rib who had been residing on the other side of the lake, at the plentiful fishery opposite Fort Franklin. Our visitor, a stout, able-bodied fellow, came empty-handed, and introduced himself as a very serviceable man, who had been of great use to our two fishermen stationed at Fort Franklin. We readily understood that the truth concealed under this self-praise was, that he had been living by their labours, perhaps bringing in a little wood for them occasionally, but really sharing in the produce of their nets. On questioning him more closely as to the object of his coming, he at length said that he came to look for a wife. Had he no wife? Yes, he had had one, but an Indian had taken her from him. Had he an aversion to his wife that he had parted from her without a struggle? No; his wife was a very good wife; she suited him very well. Then why did he not fight for her? "You see," said he, "it was a big Indian that took her! I am a little fellow, what could I do!" This hero met with little countenance from us, and after being fed for two days, an intimation was made to him that he would receive no more rations; on which he followed the others, and, as we afterwards learnt, soon procured another helpmate.

The singular national custom of the women being the property of the strongest, had been acted upon a short time previously at the fishery. A blind man, who was more assiduous in setting trout lines, and more successful as a fisherman than most of the others, was deprived of his wife on the general movement of the party, by an old fellow who wanted her to drag his sledge. Mr. Bell questioned the ancient Paris about the truth of the report when he came to the fort, and instead of denying the fact, or seeming ashamed, he gloried in the deed as a manly action. A child, the offspring of her former connection, followed the fortunes of the mother.

After Mr. Bell and I quitted the fort in May, the rein-deer migrating towards the sea-coast left the Indians again in straitened circumstances. The active hunters moved towards the open country in quest of musk-oxen, and the more helpless threw themselves on Mr. Rae's compassion at the fort. He distributed among them the remains of the dried meat brought from Fort Simpson, and a quantity of musk-bull meat, which was too strong for his own men, but which the natives relished greatly. Thus furnished they betook themselves reluctantly to various fisheries. Such is the life which these poor creatures lead. Occasional feasting and rejoicing, with intervening periods of want, sometimes of absolute famine. With proper management, the natural resources of the country would support a population ten times as great; but as long as all the drones of the community claim a right to appropriate to their own wants the produce of the exertions of an industrious hunter or fisherman, no certain provision for the future will be made. The first step in advance will be the formation of fishing villages, and the culture of barley and potatoes; and, under the guidance of intelligent missionaries, this might be effected without much difficulty; while, at the same time, the truths of Christianity might be brought to bear on the heathenism and moral defects of the 'Tinnè nation.

The preceding details may lead the reader to imagine that the Dog-ribs or Hare Indians are an unhappy race; but such is not the case. They are timid, and assume the attitude and solicitations of beggars in their intercourse with white people; but among themselves they are lively, volatile, and full of fun and mirth, which even an empty stomach cannot suppress.

With regard to the progress of the seasons, the "Indian summer," as it

is called, brought us three weeks of fine weather after our arrival in September. The centre of Bear Lake usually remains open till late in December, but by the middle of October the bays and straits are frozen across. As the structure of ice has of late years attracted the attention of speculative geologists, principally in connection with the movements of glaciers, I am induced to mention here a few facts which intruded themselves on my observation during my residences in the fur countries.

The first step in the freezing of rivers in this rigorous climate, after the water has been cooled down to 32° by a succession of cold weather, is the formation of somewhat circular plates of ice, six or eight inches in diameter. These drift for a time with the current, until they have become numerous enough to cover the surface of the water, when they are arrested in a narrow part of the river, or by any slight obstacle, and speedily adhere to each other, after which the interstices between the circles fill rapidly with crystals that bind all firmly together. The sheet of ice thus produced is at first nearly opaque; but when, in the course of a day or two, it has acquired the thickness of a few inches, it becomes transparent, and remains so until a fall of snow has obscured the surface. In unsheltered lakes the wind drifts the snow to the beach, and would perhaps keep the ice clean for great part of the winter, were it not that in certain hygrometric conditions of the atmosphere small starry tufts of most beautiful tabular and latticed crystals are deposited at short intervals on the ice, and freeze firmly to it. In a dry atmosphere these crystals evaporate again, but should a fall take place of the fine, dust-like snow, which is the most common kind in the high latitudes, they serve to detain it until it consolidates, so as to resist the wind. It is rare, however, for the snow to lie more than a foot deep on any of the large lakes, unless where it has drifted under the lee of piled-up slabs of ice, or of rocks, islands, or other shelter.

During winter the ice receives an increase of thickness from beneath, and at the same time evaporates above; the latter process going on with a rapidity that would scarcely be credible to one ignorant of the extreme dryness of the air in an arctic winter. The ice acquires a thickness of from four to eight feet, according to the severity of the season, the depth of the lake, and other modifying circumstances; and I desire here to advert especially to the fact, that although it is constructed of successive horizontal additions beneath, when it decays in spring it consists of

vertical prisms, penetrating its whole thickness, and standing side by side like the columns of a basaltic cliff; which, in their mode of formation, have, I imagine, a close analogy. Dr. Slagintweit informed me that neither the ice nor the basalt forms exact prisms, the angles never having the precise measurements of true crystals. In this condition the ice may be strong enough to support a considerable weight; and I have travelled over it with a large party on several occasions when the prisms on which the foot rested were depressed at every step, and a pointed stick could be driven through the whole thickness into the water beneath, with as much ease as into a bank of snow. The ice then, in fact, presents the physical characters of a semi-fluid mass, as pointed out by Professor Forbes, its parts being moveable on each other, not only vertically, but as in the case of travelling glaciers, capable of gliding past one another horizontally.

In spring, when the action of the sun-light is very powerful, an incipient thaw takes place at mid-day on the surface of the snow, which, on freezing again, acquires a glassy crust. As the season advances, but while the temperature of the air is still even at noon far below the freezing point, the crust in clear weather becomes penetrated in the direction in which it is struck by the sun's rays at mid-day by innumerable canals, and finally crumbles into a granular mass like the *firn* of the high Switz glaciers, that crackles under the feet as soon as the sun sinks towards the horizon. This firn is not universal; it is more common within the arctic circle, and in situations where there seems to have been originally a certain looseness in the texture of the snow, and where its surface is so much inclined that the sun's rays do not fall on it obliquely about noon. I did not notice it in any quantity on the level surface of a lake.

The rapid evaporation of both snow and ice in the winter and spring, long before the action of the sun has produced the slightest thaw or appearance of moisture, is made evident to residents in the high latitudes by many facts of daily occurrence; and I may mention that the drying of linen furnishes a familiar one. When a shirt, after being washed, is exposed in the open air to a temperature of 40° or 50° below zero, it is instantly rigidly frozen, and may be broken if violently bent. If agitated when in this condition by a strong wind, it makes a rustling noise like theatrical thunder. In an hour or two, however, or nearly as quickly as it would do if exposed to the sun in the moist climate of England, it dries

and becomes limber.

Mr. Rae mentioned to me another example of the same fact, which bears on the transportation of boulders, and may interest geologists. During his memorable residence on the shores of Repulse Bay, he noticed several large boulders which were partially exposed at low water. When the sea froze they became engaged in the ice, and were lifted with it from the bottom by the flood-tides. The ice gaining at each tide in thickness beneath, and losing above by superficial evaporation, the boulders in process of time came to rest in pits on its surface.

In consequence of the extreme dryness of the atmosphere in winter, most articles of English manufacture made of wood, horn, or ivory, brought to Rupert's Land, are shrivelled, bent, and broken. The handles of razors and knives, combs, ivory scales, and various other things kept in the warm rooms, are damaged in this way. The human body also becomes visibly electric from the dryness of the skin. One cold night I rose from my bed, and, having lighted a lantern, was going out to observe the thermometer, with no other clothing than my flannel night-dress, when, on approaching my hand to the iron latch of the door, a distinct spark was elicited. Friction of the skin at almost all times in winter produced the electric odour.

In November the snow was deep enough for sledges to run without receiving much injury. On the 1st of December the sun was just visible for an instant at noon, from an eminence behind the house. This month was a cold one, and the coldest days in the year were the 17th and 18th, when the average temperature for forty-eight hours was 55½° below zero of Fahrenheit. The lowest observation made was at seven in the afternoon of the 17th, at which time the temperature was 58.9° F. The thermometer, one of Adie's making, was hung by the side of a dozen by the same artist, none of which differed a degree from it. When tested by freezing mercury, this one stood at 36°, which is considered to be from 4° to 6° too high; so that, making the smallest of these corrections, the actual minimum temperature we observed was 65° F.[25] This is one of the greatest colds on record, and pains were taken to ascertain it correctly.[26]

Even at mid-winter we had three hours and a half of daylight. On the 20th of December I required a candle to write at the window at ten in the morning. On the 29th the sun, after ten days' absence, rose at the fishery,

where the horizon was open; and on the 8th of January, both limbs of that luminary were seen from a gentle eminence behind the fort, rising above the centre of Fishery Island. For several days previously, however, its place in the heavens at noon had been denoted by rays of light shooting into the sky above the woods. The lowest temperature in January was 50° F.

On the 1st of February the sun rose to us at 9 o'clock and set at 3, and the days lengthened rapidly. On the 23d I could write in my room without artificial light from 10 A.M. to half-past 2 P.M., making four hours and a half of bright daylight. The moon in the long nights was a most beautiful object; that satellite being constantly above the horizon for nearly a fortnight together in the middle of the lunar month. Venus also shone with a brilliancy which is never witnessed in a sky loaded with vapours, and unless in snowy weather, our nights were always enlivened by the beams of the Aurora.

In February the lowest temperature was 56° F. (or 62° corrected), and in March, 44° F. (48°) was the lowest observed. On the 20th of April, signs of the snow softening on the south side of the house, contiguous to the walls, were perceived. The day by this time had lengthened so far, that I was able to read off the degrees of the thermometer by daylight at nine in the evening. Snow birds arrived in small flocks, and on the 27th the snow began to melt in sheltered places, exposed to the direct rays of the sun. Ospreys, gerfalcons, eagles, and gulls appeared on the 17th of May; and, from the 19th to the 23d, melted snow stood deep on the surface of the ice. On the prior of these two dates, the first goose was seen. The geese approach the high latitudes as soon as the swamps are uncovered, when they feed on the undeveloped flowering stalks of the cotton-grass and other *Cyperaceæ*. Their arrival is thus an indication of the progress of spring, and frosty weather will sometimes drive them back for a week or so to a milder district. The impulse, however, by which they are urged to their breeding stations is so uncontrollable, that in backward seasons they are driven to the sea coast before the snow is gone, and then, from want of food, they are in a very lean condition. Their incubation, the fledging of the goslings, and the moulting of the parents, has to take place before the end of August, when old and young pass southwards to spend the winter in more genial climes. An indelible attachment leads them back to their natal

places, and the ensuing summer sees them winging their way northwards in cuneal bands, with unerring instinct. Their arrival in a district enlivens white man and Indian: during their passage, plenty reigns in every encampment; and the dingy, pot-bellied children run about with smiling, greasy faces, brandishing in each hand the leg or wing of a goose.

The Canada geese come in the van, and remain breeding in the woody country; snow geese next arrive, and pass onwards to Wollaston's Land; then the laughing geese come and go, holding a north-west course; and at the same time with the latter, the Hutchin's geese speed to the sea coast.

On the 22d, pin-tail ducks were seen; on the 24th, swans; and, on the 30th and 31st, large flocks of snow geese and brown cranes passed northwards. On the 1st of June, bees, sandpipers, long-tailed ducks or cacawees, eider and king ducks, and northern divers were seen: the catkins of the earliest willows also burst their envelopes on this day. On the 5th, teal, widgeon, scaup-ducks, shovellers, and jagers arrived; but, on the 8th, the fur of the polar hare was still white.

The progress of spring at Fort Confidence, subsequent to the 7th of May, is recorded from Mr. Rae's notes, as on that date Mr. Bell and I commenced our journey southwards. To contrast with the above the dates of the arrivals of the migratory birds at Fort Franklin in the same season are here added, the difference of latitude between the two places being a degree and three quarters.

On the 11th of May, under a hot sun, a pool of water had formed on the ice near the bay of the Deer Pass. We bivouacked on the shore beside it, and had not yet arranged our sleeping-places, when a Canada goose alighted in the pool. It was scarcely allowed to settle before it was shot, and, with a celerity unknown in civilised lands, stripped of its feathers and committed to the cooking-kettle. This was evidently a straggler, and must have seen the small pond in which it alighted from a great distance; for, on our arrival at Fort Franklin on the following day, we learnt that neither our two fishermen employed there, nor an Indian residing near them, had as yet seen any of the spring birds. On the 14th the Indian saw gulls; on the 18th, snow geese and various small birds came, together with the pretty little gull named *Xema bonapartii*, which in large flocks sought for insects in the open water now forming along the shores of the smaller lakes. On the 22d, bands of snow geese passed to

the north-west, flying high. They evidently found the country about Fort Franklin still too closely wrapped in its winter garb, and were winging their way to the valley of the Mackenzie, where the season is earlier.

Geese, according to Mr. Bell's information, arrive at Peel River Fort, upwards of two degrees farther north, from the 12th to the 15th of May, rarely varying above a day or two, the 15th being the date of their coming in backward seasons. At that time they find the marshy places bare of snow, and can procure the roots of bents and other plants on which they feed. There, as elsewhere, the Canada geese precede the snow geese a day or two. The Hutchin's geese[27] come later, and pass high overhead towards the north. The Indians believe that a small finch (*Plectrophanes lapponica*) avails itself of the strength of wing of the Hutchin's goose, and nestles among its feathers during its flight. When a goose is shot, they often see the small bird flying from it. Neither Mr. Rae nor I noticed such an occurrence, nor did I obtain a confirmation of it from the personal observation of any of the gentlemen resident in the country, but it is generally affirmed by the Indians.

While we were at Fort Franklin, Mr. Bell, who was employed all day in shooting geese, pointed out to me a fact in the natural history of the snow and laughing geese. Though they migrated in large flocks, each had already selected its mate; and if the female was shot, the male bird instantly separated from the rest, and descended to look after her. In this way, he often fell a victim to his conjugal fidelity; but if he escaped the shots aimed at him, and became shy, he would still continue for hours, and even days, searching the neighbourhood for his lost mate. The case was different if the male bird fell first. The female, it is true, also left the flock, but she kept more aloof, and generally, after making a circle or two round the spot where the body of her partner lay, went off with the next flock that came up.

The laughing geese passed Fort Franklin a few days later than the snow geese, but a single individual was often seen some days before the arrival of the main body, associated with a flock of snow geese, and generally acting as leader by assuming a station in the apex of the angle in which they fly. About the same time, the American robin, or migratory thrush, came with the yellow-poll and black and yellow warblers (*Sylvia æstiva et maculosa*). The latter fed on the berries of the Alpine arbutus, as did likewise the golden plovers, whose stomachs also contained the

juicy fruit of the *Empetrum nigrum*. The Eskimo curlew at this time fed on large ants. It would appear that these insects descend to the stomachs of the curlews alive, since I found that several, having taken fast hold of the lining of the gullet with their mandibles, remained sticking there, and even after death required some force to detach them. The tree bunting (*Fringilla canadensis*), black-finch (*F. hyemalis*), and white-crowned finch (*F. leucophrys*)[28] were also early visitors, and soon after their arrival began to construct their nests. The Lapland finch was also seen, but only on its passage to the coast. The *Lestris richardsonii* flew about in pairs, and was observed to have the habit of quartering the ground like the hen-harrier. In the stomach of one which I killed, there were the skin and some of the bones of a mouse, rolled into a ball, like the pellets that are rejected from the stomach of an owl. The purple-throated diver visited Bear Lake River in considerable numbers. This species is easily distinguished from the great northern diver (*C. glacialis*), while flying, by its swollen, bluish-grey neck. Almost all the summer birds arrived before we left that neighbourhood; but I have enumerated only the earliest comers, or those which I had not previously seen in so high a latitude, and whose range is, therefore, not correctly given in the *Fauna boreali-Americana*.[29]

Great Bear Lake is navigable for its whole extent for only fifty days in the year. It is frozen over later than shallower pieces of water in its vicinity, but the ice remains longer unbroken, and drift ice continues on its surface till the middle of August. On the 7th of May, the day on which Mr. Bell and I set out to travel to Fort Franklin, the ice was as firm as in mid-winter; and, though the snow softened in fine weather, it still covered the ground deeply.

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[21] This altitude was ascertained by Mr. Rae in the spring of 1848 by the aneroid barometer.

[22] The magnetic observations are now in process of reduction at Woolwich, and will soon be published under the superintendance of Lieutenant Colonel Sabine, along with an abstract of the meteorological observations.

[23] We had large supplies of cranberries, bleaberries, and the fruit of the amelanchier, the produce of the country; which, with a few pounds of Zante currants, served for tarts and pies all the winter.

[24] Its Dog-rib name is *Nòh-gaiyĕ*, pronounced from the depths of the throat with a strong aspirate on the *h*. The exact dimensions of a wolverene, which was surprised in one of our *caches* and killed in the month of March, were as follows:—

	Inch.
Length from root of tail, measured along the back and between the ears to the point of the nose	30.5
Length of stump of tail	6.5
„ of long hairs at top of ditto	5.5
Total length of animal, including the entire tail	42.5
Height at fore shoulder	12.0
„ at rump	12.6
Breadth of fore paw, the toes moderately spread	2.5
„ of hind paw	2.7

The legs are remarkably muscular, the fore ones in particular, when skinned, having a strong resemblance to a finely proportioned, muscular human arm, rather than to the limb of a quadruped. The paws are covered underneath with long matted fur in winter, so that the small callosities that do exist are discovered with difficulty. The anal glands, one on each side, of the size of an olive, are filled with a very fetid secretion of a yellowish colour, and the consistence of cream. A young female produces two young; an older one four; and it brings forth later in the summer than other ferine animals inhabiting the same districts.

[25] Mr. Saunders, commander of the North Star, records 64½° F. as the lowest temperature observed in Wolstenholme Sound in the winter of 1850.

[26] In two thermometers made by a London artist, and hung up beside the others, the spirit retreated into the bulb, though the scales were graduated down to 73°. In freezing mercury, these thermometers indicated 55°, being about 15° too low. Mr. Adie's thermometers were constructed under the superintendence of Professor Forbes of Edinburgh. The precautions used to insure their correctness will be detailed when the meteorological observations at Fort Confidence are published.

[27] These are commonly called "Eskimo geese" in Rupert's Land.

[28] I have already mentioned the nocturnal song of this bird, which breeds throughout Rupert's Land. In attempting to express its clear, loud notes by syllables, the nearest approach I could make was *cheet-cheet, tareet, cheet, cheet*. The first two syllables are loud and high, the next two short, and the two last lower and softer.

[29] From Mr. Murray, I have received the following account of the arrivals of the water-fowl in the Valley of the Yukon. "Of the two kinds of swan, only the largest sort (*Cygnus buccinator*) are seen here; they pass on to the northward of the Porcupine River, to breed among the lakes. Bustards (*i. e.* Canada geese) are plentiful, and breed everywhere, from Council Bluffs on the Missouri to the vicinity of the Polar Sea. On the ramparts of Porcupine River they frequently build high up among the rocks, where one would suppose only hawks and ravens would have their nests. How they take their young down is unknown to me, but they must be carried somehow.

Ravens and large gulls are very destructive to young geese. With respect to the breeding-quarters of the laughing geese (*Anser albifrons*), I am able to inform you correctly, having myself seen a few of their nests; and, since the receipt of your letter, made further inquiry among the northern Indians. Their nests are built on the edges of swamps and lakes, throughout most of the country north of the Porcupine, where the ground is marshy. It is only near the most northerly bends of that river that any are seen in the breeding season, and these are male birds. They pass to their breeding-places in the beginning of June, and make their nests among long grass or small bushes, where they are not easily seen. They are shy birds when hatching; and, when any one comes near the nest, manage to escape unperceived, and then show themselves at a distance, and manœuvre like grouse to lead the intruder away from the place. Notwithstanding our ruthless habit of collecting eggs of all kinds to vary our diet, I have often felt for a laughing goose, whose anxiety for the safety of its eggs was frequently the means of revealing to us the situation of its nest. When the bird was swimming some hundreds of yards off, immediately that any person in walking round the lake came near its treasure, the poor bird began to make short, impatient turns in the water, resuming her calm demeanour if the intruder passed the nest without seeing it. As soon as the eggs are taken, the goose rises out of the water and flies close to the head of the captor, uttering a frightened and pitiful cry. These geese are more numerous in the Valley of the Yukon than any other kind; and the numbers that pass northwards there are perhaps equal to that of all the other species together. The *Gens du large* (*Neyetse-kutchin*), who visit the north coast regularly to traffic with the Eskimos, say that they have never seen any

flying northwards over the sea in that quarter. White geese (snow geese, *Chen hyperboreus*) are also passengers here, and there are likewise *black geese*, which I presume you have never seen. A few of them pass down Peel's River, but they are more abundant on the Yukon. They are very handsome birds, considerably smaller than the white geese, and have a dark brown or brownish black colour, with a white ring round the neck, the head and bill having the shape of that of the bustard." (This description applies pretty well to the brent goose (*Anser bernicla*)). "The black geese are the least numerous and the latest that arrive here. They fly in large flocks with remarkable velocity, and generally pass on without remaining, as the others do, some days to feed. When they alight, it is always in the water; and, if they wish to land, they swim ashore. They are very fat, and their flesh has an oily and rather disagreeable taste. Bustards, laughing geese, ducks, and large gulls make their appearance here from the 27th to the 29th of April. Snow geese and black geese about the 15th or 16th of May, when the other kinds become plentiful. They have mostly passed by the end of the month, though some, especially the bustards, are seen in June. The white geese and black geese breed only on the shores of the Arctic Sea. They return in September and early in October, flying high, and seldom halting."

CHAP. XVI.

MR. RAE'S EXPEDITION IN THE SUMMER OF 1849.—INSTRUCTIONS.—HE CROSSES TO THE COPPERMINE.—DESCENDS THAT RIVER.—SEA COVERED WITH ICE.—SURVEYS RAE RIVER.—ESKIMOS.—CAPE KENDALL.—CAPE HEARNE.—BASIL HALL BAY.—CAPE KRUSENSTERN.—DOUGLAS ISLAND.—DETENTION.—DANGEROUS SITUATION.—AUGUST 23., RETURN.—AUTHOR AND MR. BELL LEAVE FORT CONFIDENCE.—CROSS GREAT BEAR LAKE.—DESCEND BEAR LAKE RIVER.—DAVID BRODIE LOST IN THE WOODS.—HIS ADVENTURES.—FORT SIMPSON.—METHY PORTAGE.—RECEIVE ENGLISH LETTERS.—NORWAY HOUSE.—PART FROM THE SEAMEN AND SAPPERS AND MINERS.—CONTINUE THE VOYAGE TO CANADA.—BOSTON.—LAND AT LIVERPOOL.—SUMMARY OF THE PRESENT STATE OF THE SEARCH FOR SIR JOHN FRANKLIN.

Having in the preceding chapter mentioned such occurrences during our winter's residence at Fort Confidence as seemed most worthy of notice, this is the most appropriate place for introducing an account of Mr. Rae's endeavours, in the summer, to reach Wollaston Land, and complete the search in that quarter. Had we succeeded in taking our boats up the Coppermine, beyond the reach of the Eskimos, according to our expectations when the plan of search was formed, the voyage might have been resumed in the summer of 1849 with two or three boats; and, in that case, both Mr. Rae and I would have gone, that we might aid each other among the ice. But, having been compelled to leave our craft in September without the smallest hope of their being found again in a seaworthy condition, and having only one boat remaining that could be employed on the service, it became necessary to determine which of us should take charge of that vessel and of the small party it could contain. Setting all personal considerations aside, and looking solely to the means

of providing for the examination of as large a portion of the Arctic Sea as could be accomplished, I had no hesitation in deciding in favour of Mr. Rae. His ability and zeal were unquestionable; he was in the prime of life, and his personal activity and his skill as a hunter fitted him peculiarly for such an enterprise. The arrangement I made for withdrawing the European party, and employing volunteers from the men engaged in the country, was a considerable pecuniary saving, which I was bound to consider, as far as I could, without cramping the means of search.

It has been already mentioned that Mr. Rae explored the country between Fort Confidence and the Coppermine River in winter, to select the best route for dragging the boat over in spring. In April he conveyed provisions, boat stores, and other necessaries across to the Kendall on dog-sledges, and left two men at Flett's station in charge of them, together with two Indian hunters. Before the end of the month we learnt that they had obtained both musk-ox and rein-deer meat, and were drying part of it for summer use. The subsequent proceedings are told in the following official documents, which I quote entire, premising that the names of the men composing his party were—

Boat's crew.

Neil McLeod	Orkney man.
James Hope	Cree Indian.
Thomas Hope	„
Halcro Humphrey	Orkney man.
Albert One-eye	Eskimo.
Louis Olivier	Canadian.

Left in charge of Fort Confidence.

Baptiste Paul	Canadian.
Louis Dubrill	„

"Fort Confidence, Great Bear Lake,
May 1. 1849.

(Memorandum.)

"As in the prosecution of the search for traces of the Discovery Ships under command of Sir John Franklin, the continental coast line between the Mackenzie and Coppermine Rivers has been carefully examined, the only part of my instructions not yet complied with, is the examination of the adjoining shores of Wollaston and Victoria Lands, which the state of the ice in Dolphin and Union Straits rendered inaccessible last autumn. That these two islands are separated from each other by a strait lying between the 111th and 113th meridians, is rendered almost certain by a consideration of the direction of the flood tide, which, on the west side of these parallels, sets to the westward through Dolphin and Union Straits, and to the eastward of them, sets to the eastward towards Cape Alexander; coming, we must conclude, from the northward between the lands in question: for the survey by Messrs. Dease and Simpson has shown that the coast of Victoria Land is continuous up to the 111th parallel; and the latter gentleman records his opinion, that much of the heavy drift ice that encumbers Coronation Gulf descends between these lands from the north.

"The exploration of the shores of this strait is of much importance in the search for the Discovery Ships, for the following reasons:—Sir John Franklin having been directed to steer to the south-west after he had passed Barrow's Straits, would be led directly into it, and he would be deterred from attempting a more westerly course by the circumstance of Sir Edward Parry having found that route impracticable for two successive seasons. Should there be several islands between Wollaston and Banks's Lands, and the channels between them be intricate, it is not unlikely that the ships may have been shut up therein by ice. It was the intention of Sir James Ross, in the event of his reaching Winter Harbour last year, to send a party across the ice this spring to pass between Victoria and Wollaston Lands towards Cape Krusenstern and the Coppermine River. To co-operate with that party and to aid it with provisions, or to supply its place, should circumstances have prevented its being sent, it is expedient that a party

should go from hence, and as you and a sufficient number of men have volunteered for this service, I hereby, in virtue of the clause of my instructions which authorises me to detach you and a party of volunteers under your command, appoint you to this duty. You are therefore to descend the Coppermine River; and as soon as the sea opens in July, are to proceed to explore the strait in question, endeavouring to communicate with any parties of Eskimos you may meet with on Wollaston or the neighbouring islands. Should you reach the northern coast of Banks's Land, you are there to erect a pile of stones, and deposit a memorandum of your object and proceedings at the distance of 10 feet from its base, marking that side of the pile with a broad arrow in red or white paint. You are also to erect similar piles, and deposit in the same manner on conspicuous headlands, memoranda for the guidance of the party detached by Sir James Ross, when you can do so without materially delaying your progress. Should you discover any signal posts erected by that party, and learn from the memoranda deposited near them that the strait has been sufficiently explored down to that place, you are to proceed no further in that direction; and you are at liberty to use your own judgment in deviating from this route, if, from information given by the Eskimos, or obtained from other sources, you are of opinion that the ships, or part of their crews, may be found in another quarter.

"Having the fullest confidence in your judgment, experience and prudence, I shall not name a period to your advance, further than by requesting you not to hazard the safety of the party entrusted to your care, by delaying your return too long. The last season furnishes a strong instance of the early date at which the winter occasionally commences in these seas.[30]

"Having performed this service, or prosecuted it as far as practicable, with a due regard to the safety of your party, you are to return with all speed to Fort Confidence, and, embarking without delay the instruments and stores remaining at that post, to proceed forthwith to Fort Simpson. Such of

the stores as are useful to the Company are to be valued and handed over to them, and the instruments are to be forwarded to England, addressed to the Secretary of the Admiralty. The men are to be sent to winter at some fishing station sufficiently to the southward to ensure their early arrival at Norway House next spring; and you are to direct them to be furnished with nets, that they may provide for their own sustenance during the winter, with as little expense to the Government as possible.

"Immediately on your return from the coast, you are to communicate an account of your proceedings to the Secretary of the Admiralty, for the information of their Lordships; and you are also to transmit to him a chart of any hitherto unexplored coasts or straits you may discover, as soon as you have had leisure to construct it.

"Given under my hand, at Fort Confidence, 1st May, 1849.

(Signed) "JOHN RICHARDSON,
Commanding Arctic Searching Expedition.

"John Rae, Esq."

Copy of a Despatch from Mr. Rae to the Secretary of the Admiralty, narrating the Proceedings of the Expedition under his Command to the shores of the Arctic Sea, in the Summer of 1849.

"Fort Confidence, Great Bear Lake.
September 1. 1849.

"Sir,

"I have the honour to acquaint you, for the information of my Lords Commissioners of the Admiralty, that the expedition under my command, which descended the Coppermine this summer to the Arctic Sea, for the purpose of examining the shores of Wollaston and Victoria Lands, in search of Sir John Franklin and party, returned to this place to-day, having been quite unsuccessful in its object, and with the loss of Albert, the Eskimo interpreter, who was drowned at the Bloody Fall, the

particulars of which unfortunate accident I shall mention hereafter.

"Having made every requisite arrangement at Fort Confidence for facilitating our progress across land to the Coppermine, I waited impatiently for the disruption of the ice on Dease River, to which our boat was hauled on the 7th of June. Next day we learned that the upper parts of the river were clear of ice; and on the following morning I started in company with four men and two Indians, and a couple of sledges on which our baggage and provisions were stowed. The Dease was still covered with strong and solid ice for two miles up its course, over which we hauled the boat before getting to open water.

"Our ascent of the stream was extremely slow, owing to the many barriers of ice (some of them six or eight miles long) over which we had to launch the boat, and it was the 15th before we arrived at the forks of the river, where it was my intention to diverge from the route of Dease and Simpson. They followed the north branch, whilst we ascended the south-east one. This stream was also much obstructed by ice, and so very shallow, consequent on the coldness of the weather, which prevented the snow on the high grounds from thawing, that the whole party were almost continually up to their knees among water and snow engaged in launching the boat. In ordinary seasons it was evident, by marks along the banks, that there is sufficient water for a boat drawing some inches more than ours throughout its whole length, which is little more than 15 miles, including its various curves. On the 17th we passed over the ice on the lake from which the stream flows. It contains many islands, and its breadth, where we crossed it in a nearly south direction, is 3½ miles.

"Indian report had led me to believe that there was a creek, having sufficient depth of water for the boat, flowing from this lake into the south branch of the Kendall, which we were to descend to the Dismal Lakes; but in this we were disappointed, and consequently had a portage of six geographical miles to make overland nearly due east. I had

examined this place in the winter, but the ground being then covered with snow and ice, I could not form a correct opinion on the subject. The west end of the portage is situate in latitude 67° 10′ 48″ N.; longitude by account[31] 117° 18′ W.; and the variation of the compass 50° 49′ E.

"Crossing the portage occupied us two days; the ice had not yet broken up in many places on the river on its east side, and the water was 10 inches lower than when Sir John Richardson and party forded it last autumn; we consequently found some difficulty in descending it. Its general course is north-east by east, and length from where we entered it, to its influx at the west end of the most easterly of the Dismal Lakes, 17½ miles. On the 21st we arrived at the station on the banks of the Kendall River, to which provisions for the sea voyage had been hauled on dog sleds in April, and found the two men who had been left in charge quite well. We descended the Kendall next day to the Coppermine, which was still covered with ice, so firm and solid that a person might have crossed the river without being more than ankle deep in water.

"During five days that we were detained here, we were occupied repairing the injuries received by the boat, shooting deer to save our pemican, and making observations when the weather would permit. The result of three meridian observations of the sun gave mean latitude 67° 07′ 20″ N., and the mean variation from five sets of azimuths on different days (the extremes being 49° 38′, and 51° 55′) was 50° 37′ 48″ E. On the 28th the dwarf birch was observed to be in leaf, and the leaf-buds of the willows began to develope. In the afternoon of the same day the river was thought sufficiently open to permit us to descend it for some distance among the driving ice; but after proceeding six miles, we found the stream again blocked up. We were so often and so long detained by interruptions of this kind, that it was the 11th of July before we arrived at the Bloody Fall, having been fourteen days in doing the work of one. Notwithstanding the inefficiency of our steersman James Hope (one of Dease and Simpson's men), we ran all the rapids, including the Escape, without shipping

much water, and with all the cargo in the boat.

"Hitherto deer had been so numerous that we could easily have shot enough for the maintenance of a party double or treble our numbers. Here they had become more scarce and shy, which could be only accounted for by the proximity of the Eskimos, no recent traces of whom could however be seen. From the fall to the sea the ice remained fixed until the 13th, when it cleared away, a circumstance that was very soon indicated by the numbers of fish which appeared below the fall. With the aid of Halkett's air-boat, which had been brought from a hill some miles distant, where it had been left last season, a net was set in one of the eddies, and before the men had finished arranging it, seven fine salmon and two white fish were caught, and we afterwards obtained a supply for several days' consumption.

"On the 14th we entered the sea, and found a narrow and very shallow channel along the shore of Richardson Bay, until we came to its north side, where the ice lay against the rocks. Here the latitude 67° 51′ 19″ N. was observed; and two azimuths of the sun, the one on the meridian and the other when on the prime vertical, gave variation 57° 04′ and 56° 25′ E. Whilst encamped at this place, we were visited by seven Eskimos, one of whom I at once recognised as the active, intelligent man who had afforded Sir John Richardson's party such efficient assistance last season, when crossing the river at the head of Back's Inlet. On inquiry I learnt that they had been well supplied with provisions in the early part of winter and in spring; but that in the interval they had nearly starved, owing to the scarcity of seals, having had to subsist for some time on the skins of the larger species of these animals, which they had reserved for making boots. In the winter they had communicated, either directly or indirectly, with the natives of Wollaston Land, none of whom had ever seen whites, large boats, or ships. They were all made happy by some small presents, and a supply of fish, which they ate raw, and appeared to relish much. They left us near midnight, promising to return next day with some boots and shoes for sale.

"On the 16th, by making a number of portages over the ice, we rounded Point Mackenzie and entered Back's Inlet, which was partially open. Having a fine breeze from the east, we set sail and soon ran to its head, when we entered Rae River (discovered and named by Sir John Richardson last autumn); and on proceeding three miles up it, came to the lodges, six in number, of our Eskimo visitors, who said that they had been so much alarmed at seeing the boat under sail that they were on the point of running away.

"As there was no possibility of our making much progress along shore until the ice wasted a little more, I devoted the two following days to an examination of this river; the Eskimo whom I have already mentioned as our active assistant last year willingly agreeing to accompany us. At the distance of 9½ miles from the river's mouth, there is a perpendicular fall of 10 feet, which extends across the stream, except a few yards on the north side, where the rock slopes so much that, during the spring-floods, salmon and white fish are able to ascend, affording the natives a fine opportunity of spearing them. Here I left the boat and four of the men, whilst in company with the other two, and our Eskimo guide, I traced the river 19½ geographical miles further. Its course is nearly due west, and very straight; about the size of the Dease River, and varying in breadth from 80 to 200 yards, with a very strong current, and sufficient depth of water for a boat drawing 14 or 15 inches. It flows over a bed of limestone, and is bounded on the north, at the distance of half a mile or less from its banks, by precipices of basalt from 100 to 200 feet high, superimposed on limestone of the same kind as that which forms the bed of the river.

"At the extreme west point of our journey, we found a party of ten Eskimos with their families, who informed us that the stream maintained the same course and size as far as they had seen it, which was somewhat more than three days' march, or about sixty miles; how much further they knew not, as they had never been to its source. Two of this party returned with us to the boat, where they received presents,

which I had some difficulty in getting them to accept, as they said they had nothing to give in exchange. On the evening of the 18th we ran down stream, and landed our guide among his friends, who seemed very glad to see him return safe. They were now much less timid than when we first met them, and we pitched our tent close to theirs, without causing any apparent alarm, although it was afterwards observed that two of the men kept watch during the night.

"Early on the 19th we took a friendly leave of these simple and inoffensive people, and pulled down to the mouth of the river, where I stayed until noon, when the latitude 67° 55′ 20″ N. was observed. The cloudy state of the weather during the two preceding days had prevented any observations being made. New moon occurring to-day, it was high water a few minutes before 1 P. M.; the rise being 10 inches. In the afternoon, when on our way to Cape Kendall, we experienced a severe thunder-storm from north-north-west, which obliged us to land for shelter.

"Our advance along the coast was so slow, that we did not arrive at the place where the boats were left last autumn until the 24th. We found that they had been much broken up by the Eskimos to obtain the ironwork. The tents, oil-cloths, and part of the sails, still remained uninjured, and were of much value to us, as we were ill-provided with the two first of these articles. The 'cache' of pemican and ammunition was also untouched, having apparently escaped notice from being covered with snow. The latitude 68° 10′ 44″ N., and variation 56° 8′ E., were observed here.

"On the 27th a west-north-west breeze having cleared away the ice for a short distance from the shore, we continued our course towards Cape Hearne, which we reached before noon, and found its extreme point to be in latitude 68° 11′ 17″ N. Basil Hall Bay being filled from side to side with unbroken ice, we encamped here. Next forenoon a light south-south-east breeze opened a crack in the ice, wide enough for the boat to cross to an island in the middle of the bay, on the north side of which we found some open water, which enabled us to

get two miles beyond it. At 3 P. M. on the 30th, we arrived at Cape Krusenstern, and when opposite its high cliffs a strong breeze sprung up from north-north-east, which drove the ice so forcibly against the rocks, that we were obliged to unload with all haste, and haul the boat up on a drift-bank of snow to save it from being squeezed. Here for the first time this season we found the ice broken up in the offing, caused evidently by the strong currents of the ebb and flood tides; whereas on looking in the direction from which we had come, all, except immediately along shore was smooth, white, unbroken, and apparently as firm as in winter.

"We were now at the most convenient though not the nearest point for making the traverse to Wollaston Land, passing close to Douglas Island, and there was no necessity for our proceeding further along the shore, even had we been able to do so, which at present was impossible; the high rocks presenting an insurmountable barrier on the one hand, and the ice by its roughness equally impassable on the other. We pitched our tents on the top of the cliffs, in the ascent of which the before-mentioned snow-bank served as a ladder, and waited for the first favourable change in the ice.

"A few days afterwards, Albert (the Eskimo interpreter) and one of the men, when some distance inland looking for deer, overtook five Eskimos travelling to the interior with loads of salmon, which they had speared in a rivilet that falls into Pasley Cove. From these the interpreter learnt that the sea ice had commenced breaking up only one day before our arrival, and that they had been in company with the natives of Wollaston Land during the winter, none of whom had ever seen Europeans, large ships, or boats.

"During our long and tedious detention here, several gales of wind occurred, principally from the northward, but the space of open water was so small that they produced little effect upon the ice. Our situation was most tantalising to all the party: occasionally at turn of tide a pool of water, a mile or more in extent, would appear near us, and every thing would be prepared for embarkation at a minute's notice, in

expectation of the opening increasing and permitting us to cross to Douglas Island, but our hopes were always disappointed. A number of observations were obtained, which placed our encampment in latitude 68° 24′ 35″ N., the longitude being very nearly the same as that assigned to it by Sir John Richardson and Mr. Kendall. The mean variation of the compass, from eight sets of azimuths, on different days, and at different hours, was 59° 8′ 08″ E., the extremes being 57° 42′ and 61° 25′.

"The ice continued driving to and fro with the tides, without separating sufficiently to allow of the practicability of passing among it until the 19th August, when there was more open water to seaward than we had yet observed, caused by a moderate southerly breeze that had been blowing for the last two days. After waiting some hours for a favourable opportunity of forcing our way through a close-packed stream of ice that was grinding along the rocks as it drove to the northward, we at last pushed off, and after more than once narrowly escaping being squeezed, we reached comparatively open water, where we had room to use our oars. We had pulled more than seven miles and were still three miles from the island (Douglas), when we came to a stream of ice, so close packed and so rough that we could neither pass over nor through it; a thick fog had come on, and the ebb tide was carrying us fast to the south-east. Under these circumstances I thought it advisable to return towards the main shore, on which we landed early on the morning of the 20th, a short distance to the south of the place from whence we had started. A north-west breeze came on some hours after landing, and cleared away the ice a few yards' distance from the beach, of which we took advantage to shift our quarters, which being under some crumbling cliffs, were neither safe nor convenient. We poled along shore for three miles or more towards Point Lockyer (the only direction in which we could go), and then took shelter in a small bay, into which we had scarcely entered when the wind changed to east-north-east, and in a very short time left not a spot of open water visible,

either near shore or at a distance.

"The wind continued to blow from east and north-east for the two following days, during which, when the tide was in, we advanced a few miles to the south, principally by launching the boat over the ice. On the evening of the 22d I ascended a hill near the shore, from which a fine view was obtained. As far as I could see with the telescope in the direction of Wollaston Land, nothing but the white ice forced up into heaps was visible, whilst to the east and south-east there was a large space of open water, between which and the shore a stream of ice, some miles in breadth, was driving with great rapidity towards Cape Hearne and its vicinity.

"As the fine weather had now evidently broken up, and as there was every appearance of an early winter, I thought it would be a useless waste of time to wait any longer in hopes of being able to cross to Wollaston Land; I therefore gave orders for our return towards the Coppermine, at which I did not expect to arrive in less than a week, as the ice wore as unfavourable an aspect as it did last year.

"At an early hour on the 23d the men commenced carrying the baggage to Point Lockyer, still more than a league distant, and afterwards hauled the boat to the same place; doing this gave all the party ten hours' hard work; but our fatigues were soon forgotten on finding some open water on the south side of the point, in which we were speedily afloat and sailing before the fast-decreasing breeze. It fell calm in half an hour; but we plied our oars to such good purpose, that we pitched our tents late at night on Cape Hearne. Here I had expected to find the ice close packed on the shore, and quite impassable, but I was agreeably surprised to discover as we advanced, that there was a lane of open water between the beach and the pack, wide enough for us to pass through. The only way that I can account for this is, by supposing that the gale of wind that had been blowing from north-east and east-north-east had shifted to the north and north-west as it approached the land, and carried the ice along with it.

"By working seventeen hours next day we came to the

mouth of the river, and on the following morning ascended to the Bloody Fall. Here fish were still very numerous, and whilst some of the party were cooking, others set a couple of nets to obtain a supply for some days. I may here mention, that when on the coast, we obtained as many salmon and herring as we could consume, wherever there was a piece of open water large enough for setting a net to be found.

"Dease and Simpson, after hauling their boats over the rocks opposite the lower and strongest part of the fall, had them towed up the remainder by water; and as our boat was now much weakened by the rough usage it had unavoidably been exposed to, for the purpose of saving time, and the tear and wear that would be caused by having it dragged over the portage, I was desirous of doing the same. I was the more led to do this, as the men were of opinion that it might be effected with safety. All that appeared in any way difficult was easily done, and there was only one short place to be ascended, which was so smooth that a loaded boat might have passed it; here, however, from some unaccountable cause, the steersman was seized with a sudden panic, and called to those towing the boat to slack the line. This was no sooner done sufficiently to allow him to get firm footing, than he leaped on shore, followed by the bowman, and allowed the boat to sheer out into the current, where the line broke, and the boat soon oversetting, was carried into one of the eddies some distance down stream; to which Albert and I ran, and stationed ourselves at two points of rock near which the wreck would pass. It drove to where Albert was, and he hooked it by the keel with an oar until I came to his aid, when I fixed a pole in a broken plank and called my companion to assist me in holding on; he either did not hear me correctly, or thinking that he would be of more use on the bottom of the boat, sprung to it, and before I had time to call him off, or even think of his danger, they were carried by a turn of the current into a small bay, where I believed both were safe; not so, however, for the next minute they were swept out again, and the last I saw of our excellent interpreter was his making a leap towards the

rocks; he missed them and disappeared, nor did he rise again to the surface.

"This melancholy accident grieved me much, as the brave lad was universally liked for his activity, lively and amiable disposition, and extreme good nature. On James Hope, the steersman, rests all the blame of the loss of the boat; his carelessness in using a small towing-line when there was a much stronger one in the boat, and his cowardice where there was no danger, can admit of no excuse.

"On taking up our nets (which we laid carefully on the rocks for the Eskimos), they were found full of herring-salmon, in fine condition. We commenced our journey, across land, towards Great Bear Lake, on the 26th, each of the men carrying about 90 lbs., and my own bundle being nearly 50 lbs. Three days' easy march brought us to that part of the Coppermine (lat. 67° 12′ N.) from which it was my intention to make a straight course to Fort Confidence. Here we expected to meet with some Indians, but we did not fall in with them until the following evening, when our loads were much lightened, and we arrived here early this afternoon (being our seventh day from the Bloody Fall), accompanied by upwards of thirty of the natives, who had joined us at different parts of the route.

"The two men who had passed the summer at Fort Confidence were well; and having all the stores ready packed, I shall leave this to-morrow, after supplying the Indians with ammunition to enable them to hunt their way to the trading-posts.

"I have, &c.
(Signed) "John Rae.

"Fort Simpson, September 26. 1849.

"*P.S.* I arrived here this afternoon, and intend sending off the expedition men to Big Island, Slave Lake, on the 28th, with an ample supply of nets and twine, so as to enable them to procure sufficient fish for their winter provisions, without being any additional expense to Government.

(Signed) "J. Rae."

Mr. Rae's failure in crossing to Wollaston Land is to be attributed solely to the strait being filled with impracticable ice. I know from his private letters that the mortification he experienced in the result is much more severe than he has thought proper to express in his official despatch. The presence of ice in Dolphin and Union Straits and in Coronation Gulf for two or more successive seasons, where the experience of former years had led us to expect a comparatively open sea, is suggestive of the manner in which a party may be shut up in these regions, and leads to many melancholy reflections.

Every reader of my narrative of the proceedings of the expedition will be aware of how much I was indebted to Mr. Rae's activity and intelligence throughout its progress; and this seems to be the appropriate place for me to express formally my sense of obligation to him for his sound advice and co-operation on every emergency. His society cheered the long hours of an arctic winter's absence from my wife and family, and it was in a great measure owing to his skill and assiduity in observing, that our experiments on magnetism during our stay at Fort Confidence were carried on so as to be productive of scientific results.

In consequence of intelligence obtained from newspapers on my journey home, I addressed the following letter to Mr. Rae:—

"Lake Winipeg, August 19. 1849.

"My Dear Rae,

"As I learn from the newspapers which I have just read, and shall forward for your perusal, that Sir James C. Ross did not reach Barrow's Strait till after the 28th of August, and that it is probable that he may have been arrested short of his intended wintering quarters at Melville Island or Banks's Land, and could not consequently send off his proposed spring party to the Coppermine River this season, I consider it likely that he may determine on sending that party next spring; and if so, by the present arrangements they will, on their arrival at Great Bear Lake, find Fort Confidence deserted.

"I therefore think it important that you should engage either the chief of some band, or two expert hunters, to pass

the months of June and July, 1850, on the portage between Bear Lake and the Coppermine River, promising them a handsome reward if they render any assistance to the expected white party, and paying them such moderate sums, in addition to a full supply of ammunition, as may content them for spending the summer on such excellent hunting grounds.

"You will have no difficulty in engaging either Martin Lake or Bear Lake Indians for this service; and there is abundance of time, after the arrival of the March packet, by which you will receive this letter, for them to reach Fort Confidence long before the snow begins to melt. I will thank you to furnish them with five or six memoranda in waterproof cases, with directions to plant them in conspicuous places at the mouth of the Kendall, Flett's Station, Fort Confidence, and elsewhere.

"These precautions may prove to be unnecessary, as Ross's party will most likely, early in their march, discover some of your landmarks, and learn, by the notes you have left, your intention of quitting Fort Confidence this season, and thereupon turn back to the ship. But, at a small expense, if the Indians carry their instructions out fully, they will save the party, should it come on, from having to make the long journey round Bear Lake without assistance.

"I remain, &c.

(Signed) "JOHN RICHARDSON.

"*P.S.* Mr. M'Pherson recommends Tecon-ne-betah for this service."

Extract of a Letter from Mr. Rae to Sir John Richardson.

"Portage La Loche (Methy P.)
July 30. 1850.

"When the winter packet arrived and I received your instructions respecting the establishment of an Indian party on the Coppermine, the Martin Lake Chief Tecon-ne-betah was at Fort Simpson, and I had no difficulty in engaging him to pass the summer at certain stations on the route between the Kendall and Bear Lake. He received three notes which were

to be delivered to any Europeans he might meet, in which the strangers were requested to put themselves wholly in the hands of the Indians, who would guide them by the best road and feed them by the way. In the event of his not seeing any parties, other notes, with a rough chart of the best route, were supplied well wrapped in oil cloths, which were to be placed on a pole in conspicuous stations.

(Signed) "J. RAE."

Having by the preceding quotations brought the narrative of the search made by the expedition to a close, I now revert to the period at which Mr. Bell and I left Fort Confidence. A party of men preceded us by a week, taking with them the baggage, which they were directed to carry on to Fort Norman along with some pemican and stores left at Fort Franklin. This was intended as a precautionary measure to avoid the delay that might be caused by Bear Lake River being late in breaking up.

On the 7th of May we took leave of Mr. Rae, and left the fort. Bruce, Mitchell, Brodie, M'Leod, and Mastegon accompanied us in our journey over the ice, which was completed on the 12th, having occupied five days and a half. On the northern shores of the lake, the snow had lost little of its depth, and we had to clear it away to the thickness of five feet in making our encampment on Cape M'Donald; but on the southern shores we found some exposed sandy spots of ground bare, and pools of water forming at mid-day. Mastegon shot the first goose of the season on the 10th, a straggler that was tempted to cross our pathway by a pool of water produced under the influence of a powerful sun (p. 105.). Cloudy weather followed, and five or six days elapsed before the geese began to arrive in earnest.

The men who preceded us were at the fishing hut, near the site of Fort Franklin, when we arrived there. They had transported three sledge loads of pemican about seventeen miles down Bear Lake River to the usual winter crossing-place, but, finding the stream open, they had put them *en cache* on the right bank, and returned to wait further orders. According to their report the rivulets were swollen with melting snow, and travelling by land with dog-sledges was at an end for this season.

On the 14th, being Sunday, we assembled to read prayers; and, early on the following morning, Bruce set out for Fort Norman, taking

with him Dore, Cousins, Thomas Hope, Mastegon, Plante, and M'Leod. They travelled light, carrying with them merely their blankets and provisions. By the arrangement I had made with Mr. M'Pherson they were to find at Fort Norman a small barge, which Bruce was directed to bring up to us as quickly as he could. The only difficulty we anticipated was at the rapid in Bear Lake River, where lofty walls of ice remain to a late date, covering the tracking-ground. Hope and M'Leod, being part of Mr. Rae's boat's crew, were to return overland immediately with some articles from the store at Fort Norman. They did come back nine days afterwards, and passed onwards to Fort Confidence; and we learnt in the sequel that the Mackenzie did not break up at Fort Simpson till the 23d of May, being fifteen days later than Mr. M'Pherson had known it to do during twenty years' residence on its banks.

We remained waiting nearly a month for the barge, having with us Mitchell and Brodie, with the two Fort Franklin fishermen, Hector Morrison and Narcisse Tremblè. Our diet consisted of trout, white fish, Bear-lake herring and geese, the latter being Mr. Bell's contribution to the common stock. Of Fort Franklin the only vestige remaining was the foundation of a chimney stack; and the fishing hut not being large enough to hold us all, we bivouacked under the shelter of a boat's sail, as a substitute for a tent. When the water had run off the surface of the ice on the lake, so that we could transport our effects across it without wetting them, we moved to the banks of Bear Lake River; being glad to quit the vicinity of the hut, which, like all fishing quarters, became extremely disagreeable as soon as the accumulated impurities of the winter were revealed to view by the wasting of the snow. The marshy places or dry sandy banks first became bare, but many wreaths of drifted snow continued unmelted till the end of the month. We stayed at the encampment on Bear Lake River till the 8th of June, much surprised that the boat did not arrive, and forming various conjectures to account for the delay. On that day, Bruce and Mastegon came to us on foot, bringing information of the lower part of the river being still covered with ice, and that they had left the barge a few miles within its mouth. They had been four days on the march, one of which was occupied in examining the ice, which they stated formed a bridge at the rapid many feet in thickness. On receiving this intelligence, I resolved on descending to the mouth of the river on foot, and after going in the barge to Fort Norman, where I could

join Mr. M'Pherson, to send her back for the stores. These were accordingly placed in a secure *cache*, and left under the charge of Narcisse, to whom we transferred our surplus stock of fish and geese, being sufficient to maintain him eight or ten days without touching the pemican, of which there was a large reserve. The snow drifts formed excellent ice cellars for preserving fresh provisions, the only precaution necessary being to protect them from the dogs by branches of trees.

On the 9th, Mr. Bell, Bruce, and Mastegon, embarked with me in the fishing coble, and Morrison, Mitchell, and Brodie, were directed to walk along the bank of the river, each of them carrying his own bedding and clothing. I cautioned them against going inland, and promised that we would wait from time to time at particular points for their coming up. Half an hour after setting out, finding the river smoother than we expected, and Bruce being of opinion that we could embark all the party, we put ashore, and in a short time Morrison and Mitchell joined us, but David Brodie, having struck into the woods with the view of making a straighter course, did not arrive in the hour that we remained waiting for him. Supposing then that he had gone past, we resumed our voyage, taking into the coble Morrison and Mitchell.

The rate of our descent of the stream rather exceeded four miles an hour, and at half-past six A. M. we reached the *cache* situated fourteen miles from the lake. Brodie not arriving in the course of the day, I became convinced that he had lost himself in the woods, and therefore sent Morrison and Mitchell back to the lake to acquaint Narcisse with what had happened, and to endeavour to engage an Indian who was residing at the fishery to go in quest of Brodie. In the mean time we fired our fowling-pieces at intervals, and set fire to some trees that the smoke might be seen from a distance.

Mastegon, who knew that part of the country, informed me, that ten or twelve miles back from the river, there was an extensive swamp, from which there flowed one stream that fell into the Mackenzie, and another, named the Black River, which joined Bear Lake River about four miles below the *cache*. The latter stream was so rapid, he said, that Brodie would be unable to cross it on a raft, and it was not fordable; he would therefore, by following it, be certainly led to Bear Lake River.

Next day our two men came back from the lake, having themselves gone astray for some hours in the attempt to make a short cut across a

neck of land. After placing written directions for Brodie in the *cache*, we all embarked again, and in a short time came to the influx of the Black River, which was evidently flooded. Here I left another paper of instructions for Brodie, directing him to the *cache* for provisions, and to remain with Narcisse until the barge came for them. The incident of Brodie's straying gave me much uneasiness, as I feared he would experience some suffering, though I did not apprehend that he would lose his life. He was a man of much personal activity and considerable intelligence, and though his judgment would be probably at fault when he first became conscious that he was lost, I knew that as soon as he was in a condition coolly to consider his position, he would be enabled to shape a course for the river by the sun, and following its bank to return to the lake. And so it eventually happened. When he discovered that he was walking in a wrong direction, he began to mend his pace and to run as is usual in such cases, but took an inland course, and at length came to the borders of the swamp above mentioned. Here the woods being more open he obtained a distant view of the "Hill at the Rapid," which he recognised from having seen it on his former journey to the *cache*, and as he knew that we must pass it in descending the river, he resolved on walking straight for it in the hope of arriving there before us. After this he came to the Black River, and being a fearless swimmer, swam across it, carrying his clothes on his head. The stream, being very tortuous, came again in his way, when he crossed it a second and a third time in the same manner, but on the last occasion, his bundle slipping off floated away, and he regained the bank with difficulty in a state of perfect nudity. After a moment's reflection, he came to the conclusion that without clothes he must perish, and that he might as well be drowned in trying to recover them as to attempt proceeding naked. On which he plunged in again, and fortunately landed this time safely with his habiliments. He now refreshed himself with part of a small piece of dried meat, which, in his anxiety he had hitherto left untouched, and forthwith decided on finding the *cache*, and returning from thence to the lake. On the third day (11th June), he found my note together with some provisions which we had suspended to a pole for his use, but he had so husbanded his own small supply that he had still a morsel of dried meat remaining. He had no difficulty afterwards in joining Narcisse, by keeping sight of the river the whole way.

This adventure is recorded as an example of what happened to all the seamen and sappers and miners of the expedition each in their turn. Four of them were lost in the winter of 1848-49, for three days, having mistaken their way to the boat encampment in Cedar Lake. The straggling of the others was of less account, but none of them could be taught that they were liable to such accidents until they learnt it by experience. One man who strayed in the winter on Cedar Lake, when found, was contentedly steering for the moon, which, being near the horizon and gleaming red through the forest, was mistaken by him for the fire of the men's bivouack. The snow which covered the ground at the time fortunately enabled the Indian who went in pursuit of him, to trace his steps before he had gone many miles.

About twelve miles below the mouth of Blackwater River we came to the commencement of the Rapid, and hauling the coble on the beach there, proceeded on foot to the "Hill," immediately below "the Rapid," where we encamped. While on our march we perceived that the bridge of ice was giving way, and the river directly fell some feet. Early next morning Bruce went back with the men for the coble, and brought it down by the time that Mr. Bell and I had prepared breakfast for the party. After concluding that meal, we crossed the river in her obliquely, among high walls of ice; and a mile or two below came to the barge which the crew had brought up so far two days previously. A short time sufficed to launch her, embark the tents kindly provided for us by Mr. M'Pherson, and descend to the mouth of Bear Lake River, where we passed the night. Next day we went on to Fort Norman, where I purposed to wait for Mr. M'Pherson, who had gone to Fort Good Hope to bring up the year's returns of furs from that post, and from the Peel and Porcupine Rivers.

On his arrival on the 14th I sent back the small barge, to bring down Narcisse, Brodie, and the stores, and embarking with Messrs. Bell and M'Pherson proceeded to Fort Simpson. The rest of the journey homewards, being by the same route as the outward voyage, need not be mentioned in detail.

On the 25th we left Fort Simpson, having previously been joined by the men who wintered at Great Slave Lake, and also by the small barge, bringing Brodie and Narcisse Tremblè from Bear Lake. We were detained by drift ice at the west end of Great Slave Lake till the 6th of

July, and did not reach Fort Resolution till the 11th. On the 19th we arrived at Fort Chepewyan, and on the 26th at Methy Portage, which we crossed on the 27th with all our baggage, on horses hired from the Indians. From L'Esperance, who was encamped with his brigade on Methy Lake, I had the pleasure of receiving English letters, brought up from Canada by the governor's light canoe, which leaves La Chine in May. Mr. Bell at the same time received instructions to return to Mackenzie's River, to conduct the Company's affairs there. This was unpleasant tidings to him, since, having spent the greater part of his life in that northern region, he had been soliciting a change, but the mortification was softened by the society of his two daughters who had been sent from Isle à la Crosse to meet him. In taking leave of this gentleman, I must express my obligations to him for his assiduous endeavours to forward the interests of the expedition, and my high sense of his excellent management of the Indians at Fort Confidence, to which we owed a winter of abundance, and the excellent condition in which the store was left in spring. I had enjoyed much pleasure in his society, and parted from him with regret.

The remainder of the voyage down was performed in company with Mr. M'Pherson, who was going down to Canada on furlough with his family. At Norway House, where we arrived on the 13th of August, the men of my party who had been engaged there in 1847 were discharged, and the Europeans were sent down to York Factory to go to England in the Company's ship. During the time these men were under my command not a single act of disobedience occurred. Crews better fitted for heavy portage work, and for the ordinary duties of a winter's residence in the north, might doubtless have been selected in the country, but none that I could have depended upon with so much confidence in adverse circumstances. Dore and Cousins, the two younger seamen, who were extremely serviceable from their activity, intelligence, and willingness to perform any duty that was required, have gone again on the same errand to Beering's Straits.

From Norway House I proceeded to Canada in a brigade of three light canoes, manned by voyagers who were returning thither at the close of their engagements in the country. On the 14th of September we came to Fort William, and on the 25th to Saut Ste. Marie. From thence we went in a steam-vessel to the lower end of Lake Huron, and taking a

stage coach there for Orillia, crossed Lake Simcoe in a steamboat. Then we travelled by coach through Young Street to Toronto, a distance of about forty miles, and there embarked in one of the steam-packets that ply daily between that port and Montreal.

After a few days passed at La Chine with Sir George Simpson in revising the outstanding accounts between the Company and the Expedition, I went to Boston, and embarking in the British mail steam-packet, crossed the Atlantic, and landed at Liverpool on the 6th of November, 1849, after an absence of nineteen months, twelve of them passed in incessant travelling.

Without delay I presented myself at the Admiralty, and, having laid before their Lordships a narrative of my proceedings, had the honour soon afterwards to receive a letter announcing their approbation of my conduct.

Here the journal of the transactions of the expedition ends, but a summary of the present condition of the search may not be unacceptable to the many who take an interest in the fate of our absent countrymen.

Sir James C. Ross, with the "Enterprise" and "Investigator," reached the three Islands of Baffin in lat. 74° N., on the 26th of July, 1848, but was not able to cross the "middle ice" till the 20th of August, on which day he attained open water in lat. 75½° N., and long. 68° W. He then steered for Pond's Bay, and examined the coast carefully from thence to Possession Bay, in which he landed on the 26th. There he found a memorandum left by Sir Edward Parry in 1819, but no trace of Sir John Franklin. On the 1st of September, the ships arrived off Cape York, where a conspicuous landmark was erected. Sir James next examined Maxwell Bay, and some smaller indentations of the north coast of Barrow's Strait, but was prevented by a firm barrier of ice from approaching Cape Riley at the entrance of Wellington Channel. Neither could he get near Cape Rennell, because of compact, heavy ice extending from Wellington Channel to Leopold Island. Not being able to penetrate to the west, the ships were run into Port Leopold on the 11th, and on the following morning the main pack of ice closed in with the land and shut them in for the season. On the 12th of October the ships were hove into their winter quarters. During the winter many white foxes were taken in traps; and copper collars, on which were inscribed notices of the situation of the vessels, and of the depots of provision, having been

secured round their necks, they were set at liberty again.

In May, 1849, Sir James Ross and Lieutenant M'Clintock thoroughly explored on foot the west coast of North Somerset down to lat. 72° 38′, N., and long. 95¾° W., where a very narrow isthmus separates Brentford Bay of the Western Sea, from Cresswell Bay of Prince Regent's Inlet. They returned to the ship on the 23rd of June.

In the mean time, Lieutenant Robinson examined the western side of Regent's Inlet down to Fury Beach, and several miles beyond it. Lieutenant Brown had crossed the inlet to Port Bowen, and Lieutenant Barnard had traversed Barrow's Strait to the vicinity of Cape Hurd, but was unable to reach Cape Riley on account of the hummocky state of the ice. By these excursions, taken in conjunction with Mr. Rae's expedition in the spring of 1847, the whole of Prince Regent's Inlet and the Gulf of Boothia was examined, with the exception of one hundred and sixty miles between Fury Beach and Lord Mayor's Bay; and as there were no indications of the ships having touched on any part of the coast so narrowly traced, it is certain that they had not attempted to find a passage in that direction. Sir James caused a house to be built at Port Leopold, and covered with housing cloths, in which he left provisions and fuel for twelve months, together with the Investigator's launch and steam-engine. He then proceeded to cut a way out for the ships through the ice, which was not effected until the 28th of August, 1849. On leaving the harbour he crossed over towards Wellington Channel, where he found the land-ice still fast and preventing his approach. While contending with the loose packs, and struggling to advance to the westward, a strong gale of wind on the 1st of September suddenly closed the ice around the ships, wherein they remained helplessly beset until the 25th, by which time they had drifted out of Lancaster Strait, and were off Pond's Bay. As the season was now far advanced, further search that year was thus frustrated by an accident, often experienced in the navigation of the Arctic Seas; and all harbours in that vicinity being closed for the winter, Sir James reluctantly gave the signal to bear up for England.

While Sir James C. Ross was still engaged in the ice on the west side of Baffin's Bay, Mr. James Saunders, Master and Commander of the "North Star," having been sent out with supplies in the spring of 1849, was working up on the east side, with imminent danger to his ship. Owing to the unusual quantity of ice in the bay that summer, and the

frosts which glued the floes into one impenetrable mass, he was unable to cross over to Lancaster Sound, and his ship becoming involved in the ice about the same date that the "Enterprise" and "Investigator" were caught in the pack, drifted with it the whole of September, until on the last day of that month she was providentially driven into Wolstenholme Sound, where there being a pool of open water she was at length extricated. There the ship wintered in lat. 76° 33′ N., long. 68° 56¼′ W., being the most northerly position in which any vessel has been known to have been laid up. February was the coldest month, and the thermometer on two occasions marked 63½°, and once 64½°, of Fahrenheit below zero.

On the 1st of August, 1850, the "North Star" was hauled out of the cove in which she had remained ten months, and on the 8th she had crossed over to Possession Bay, which was examined. Mr. Saunders next proceeded to Whaler Point, Port Bowen, Jackson's Inlet, and Port Neill; but being prevented from landing his provisions at any of these places by the heavy landfloes of old ice, he bore up for Pond's Bay, and succeeded in depositing his cargo on Wollaston Island.

Meanwhile the search was proceeding from the quarter of Beering's Straits. Captain Kellett in the "Herald," on July 25th, 1849, after examining Wainwright's Inlet, despatched Lieutenant Pullen to the Mackenzie; and afterwards, in standing along the margin of the ice, discovered a group of high islands on the Asiatic coast in lat. 71° 20′ N., long. 175° 16′ W., with extensive and very high land to the north of them deeply seated in the ice.[32] Commander Moore, also, in the "Plover," made several attempts to penetrate to the eastward at this time, and not succeeding, returned first to Kotzebue Sound, and subsequently to Norton Sound, where he wintered.

Lieutenant (now Commander) Pullen, accompanied by Mr. Hooper, mate, and twelve men, performed the coasting voyage to the Mackenzie in two 27-foot whale-boats. He was convoyed past Point Barrow by the "Herald's" pinnace named the "Owen," and the Royal Thames Yacht-Club schooner, the "Nancy Dawson." The latter was owned and commanded by Mr. Shedden, a mate of the Royal Navy, who had come thus far with his small craft, solely at his own expense, to prosecute the search for the discovery ships, and who, though he was in the last stage of consumption, was not prevented by the languor of the disease, which carried him off two months afterwards, from giving most efficient aid to

Lieutenant Pullen.

On Sir James C. Ross's return to England in 1849, the Admiralty resolved that a still more vigorous search should be organised, and accordingly the "Enterprise" and "Investigator" were again fitted out and despatched to Beering's Straits, the former under the command of Captain Collinson, C.B., and the latter of Commander McClure. These ships having separated in the Pacific, the "Investigator," which was the dullest sailer, through a fortunate choice of route, reached the Straits first, succeeded in passing Point Barrow, and was last seen on the 4th of August, 1850. The "Enterprise," having been unable to penetrate the barrier of ice, went to Hong Kong to refit in the winter, and is to make another attempt this summer of 1851.

The preparations for the search on the side of Lancaster Sound were on a large scale. The "Resolute" was commissioned by Captain Horatio T. Austen, and the "Assistance," Captain Erasmus Ommaney, was put under his orders, together with the "Pioneer" and "Intrepid," steam tenders to the two vessels. Captain William Penny, an experienced whale-fisher, was also engaged for the search, and placed in command of the "Lady Franklin" and "Sophia." In addition to these expeditions fitted out by the Admiralty, others furnished from private sources showed the interest that was widely and deeply felt in the cause. Captain Sir John Ross, notwithstanding his advanced years, sailed in the "Felix" schooner; and by the munificence of Mr. Henry Grinnell, a New York merchant, the United States sent forth the "Advance" and "Rescue" on the same humane quest, under the command of Lieutenant De Haven, U. S. N., and Mr. S. P. Griffin. Lady Franklin likewise, with that untiring energy and conjugal devotion which has marked her conduct throughout, despatched the "Prince Albert" under the orders of Commander Forsyth of the Royal Navy.

This squadron was assembled in Lancaster Sound in the month of August, 1850, at which time the "North Star" was also there, forming in all a fleet of ten vessels. On the return of the last-named ship and of the "Prince Albert," we received intelligence from Barrow's Straits as late as the 25th of August, 1850. By that time both sides of Lancaster Sound had been thoroughly searched as far as Cape Riley on the north side, and Port Leopold on the south, also Prince Regent's Inlet down to Port Neill and Fury Beach. On the above-mentioned date, Mr. Snow, of the

"Prince Albert," went ashore at Point Riley to examine a flag-post, which had been erected by Captain Ommaney; and found a note from that officer, stating that he had landed with the officers of the "Assistance" and "Intrepid" on the cape on the 23rd, had found *traces of an encampment and collected the remains of materials, which evidently proved that some party belonging to Her Majesty's ships had been detained there. Traces of the same party were found on Beechey Island.* The note concludes by the announcement that Captain Ommaney proceeds to Capes Hotham and Walker, in search of further traces of Sir John Franklin's Expedition. No mention is made of the nature of the materials collected; but the tenor of Captain Ommaney's note indicates that he had no doubt of Captain Franklin having been off Cape Riley. Lieutenant De Haven, of the "Advance," landed on the cape on the morning of the 25th, and erected a second signal post, but seems to have carried nothing away. Mr. Snow gathered and brought off five pieces of beef, mutton, and pork bones, together with a bit of rope, a small rag of canvass, and a chip of wood cut by an axe. From a careful examination of the beef bones, I came to the conclusion that they had belonged to pieces of salt-beef ordinarily supplied to the Navy, and that probably they and the other bones had been exposed to the atmosphere and to friction in rivulets of melted snow for four or five summers. The rope was proved by the ropemaker who examined it to have been made at Chatham of Hungarian hemp, subsequent to 1841. The fragment of canvass which seemed to have been part of a boat's swab, had the Queen's broad arrow painted on it; and the chip of wood was of ash, a tree which does not grow on the banks of any river that falls into the Arctic Sea. It had, however, been long exposed to the weather, and was likely to have been cut from a piece of drift-timber found lying on the spot, as the mark of the axe was recent compared to the surface of the wood, which might have been exposed to the weather for a century.[33] Mr. Snow counted five rings of stones with two or three slabs in the centre of each circle, which he took for fire-places, but on which there were no traces of smoke nor any remains of burnt wood. As tent-pegs could not be driven into the shingly beach, the stones had been evidently used in the erection of as many tents as there were circles, and the slabs in the centre were likely to have served as stands for magnetic instruments. Colonel Sabine remarked that four tents would be needed in

using the instruments supplied to Sir John Franklin's expedition, and a fifth for the protection of the observers. If the ships were stopped in that locality about the time of the monthly term-day, the officers would almost certainly make the term observations, which last for twenty-four hours, and in that case each ship would select a separate place of observation. The term-day in August, 1845, was the 29th; and we may conclude, from the information which we at present possess, that on that day, or about a month after they were last seen, the discovery ships were off Cape Riley. It is ascertained that the bones and rope were not left by any party from other ships of the Royal Navy that have visited Barrow's Straits; and had the "Erebus" and "Terror" wintered there, a cairn, with memoranda, and many other evidences of that fact, would undoubtedly have been found. The ships must have been temporarily arrested by a barrier of ice; and Sir John Franklin, having good anchorage between Beechey Island and Cape Riley, turned the delay to the best account by making the term observations. With the prospect of soon passing the Straits, he evidently had not thought it necessary to erect a cairn, or signal-post, at the threshold, as it were, of the enterprise.

These first traces of the Expedition are exceedingly interesting, and they lead directly to the inference that it pursued its course to Cape Walker. Had Sir John, finding the Strait barred, gone up Wellington Inlet, he would undoubtedly have left a memorandum at Cape Riley, assigning reasons for departing from his instructions.

On the 25th of August, 1850, the "Assistance" and "Intrepid" were well over towards Cornwallis Island, and a little to the north of Cape Hotham. Captain Penny with his consort were standing up the west side of Wellington Channel, Sir John Ross was making for Cape Hotham, the "Rescue" was near the head of Wellington Sound on the east side, land being visible from Cape Riley, crossing the Sound just beyond her, and the "Advance" was lying under Beechey Island, having grounded on a shoal; but Lieutenant De Haven, expecting to get his vessel off without difficulty, declined the assistance from the "Albert" which was offered. Captain Austin, with the "Resolute" and "Pioneer," was at that time examining the south side of Barrow's Straits. He had visited Possession Bay on the 18th, and then intended to look into Pond's Bay. He has not been seen since, and it is probable that he passed the "North Star" and "Albert" without being descried, in the thick weather that prevailed when

they were coming out of Lancaster Sound.

Such was the state of the search in August, 1850. As Sir John Ross intended to return in 1851, after landing his stores on Melville Island[34], we may expect that he at least will bring further intelligence in October or November next.

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[30] The 25th of August was the date at which I considered it prudent that Mr. Rae should endeavour to be on the south side of Dolphin and Union Straits, and I expressed this opinion in a private note to him.

[31] The rates of the chronometers had become so irregular, or had altered so much, that they were of no use until rated anew.

[32] Captain Smyth suggests that this land may be that reached by Sergeant Andreyer in 1762, which he reported to be inhabited by a people named Kraïhaï.

[33] The grounds of these conclusions were fully stated in a report made to the Admiralty by Sir W. Edward Parry, myself, and other officers, which has been published with other parliamentary returns.

[34] Sir John Ross took with him four carrier pigeons belonging to a lady residing in Ayrshire, intending to liberate two of them when the state of the ice rendered it necessary for him to lay his vessel up for the winter, and the other two when he discovered Sir John Franklin. A pigeon made its appearance at the dovecot in Ayrshire on the 13th of October, which the lady recognised by marks and circumstances that left no doubt on her mind of its being one of the younger pair presented by her to Sir John. It carried no billet; but there were indications, in the loss of feathers on the breast, of one having been torn from under its wing. Though it is known that the speed of pigeons is equal to one hundred miles an hour, the

distance from Melville Island to Ayrshire being in a direct line about 2,400 miles, is so great, that evidence of the bird having been sent off about the 10th of October must be had, before that we can well believe that no mistake was made in the identification of the individual that came to the dovecot. Sir John's letters from Lancaster Sound mention that when he wrote he had the pigeons on board.

APPENDIX.

APPENDIX.

No. I.
PHYSICAL GEOGRAPHY.

CHAPTER I.

General View.—Rocky Mountains.—Their Length.—Their Height.—Glaciers.—Parallelism to the Pacific Coast.—Continental Slopes.—Russian America.—Eastern Slope.—Prairies.—Mississippi Valley.—Its Slope.—Fundamental Rocks of the Basin.—Silurian Strata.—Carboniferous Series.—Tertiary Beds.—Lignite Formations.—Series of Lake Basins.—Transverse Valleys.—Intermediate Belt of primitive, hypogenous, or metamorphic Rocks.—Its Rivers mere Chains of Lakes.—Its Breadth.—Altitude.—Sources of three great River Systems.—Great Fish River.—The Yukon or Kwichpack.—Basins of Excavation.—Glacial Action.—Active Volcanoes.

Valley of the St. Lawrence.—Altitudes of the Lakes above the Sea.—Lake Superior.—Lake Michigan.—Lake Huron.—Lake Erie.—Lake Ontario.—Lake Champlain.—Northern Brim of the St. Lawrence Basin.—Its geological Structure.—North Shore of Lake Superior.—Structure of the Country at the Sources of the Mississippi.

Winipeg or Saskatchewan Valley.—Height of Lake Winipeg.—Sea River.—Katchewan River.—Thousand Lakes.—Portages.—River Winipeg.—Red River.—Saskatchewan River.

Missinipi Valley.—Its Lakes.—Frog Portage.

Mackenzie River Valley.—Methy Portage.—Athabasca, Elk, or Red-deer River.—Lesser Slave Lake.—Peace River.—Slave River.—River of the Mountains.—Noh'hanne Bute.—Great Bear Lake.

Yukon Valley.—Yukon or Kwichpack.—Volcanic Chain of Alaska.—Coal.—Fossil Bones.

In drawing up the following Appendix, my object has been to record facts in the light in which they appeared to me. When treating of districts which I did not visit, I have borrowed from every work concerning them to which I had access. The most important sources of information are generally named or expressly alluded to; but I thought that it would give too much formality to so slight a sketch were I to parade every authority for the statements it contains. Where practised geologists have examined the country, their report has been chosen in preference to my own observations; and this is the case on the route of the expedition up to the 49th parallel. Beyond Lake Winipeg no geologist has yet penetrated, and the descriptions of the rocks occurring within the space of twenty degrees of latitude that lie to the north of that sheet of water are, with all their imperfections, entirely my own. It would be true economy in the Imperial Government, or in the Hudson's Bay Company, who are the virtual sovereigns of the vast territory which spreads northwards from Lake Superior, to ascertain without delay the mineral treasures it contains. I have little doubt of many of the accessible districts abounding in metallic wealth of far greater value than all the returns which the fur trade can ever yield.

The Rocky Mountain chain, which is the northern prolongation of the Andes, has a general course of north 26° W. for 2,700 geographical miles, from the 30th parallel of latitude up to the shores of the Arctic Sea. Its higher peaks rise from 12,000 to 15,000 feet above the ocean, and enter the region of perpetual snow; but the northern part of the chain, which touches on the Mackenzie, is so much lower, that even its summits[35] are denuded during the short summer of that district, and perennial patches of snow exist there only in shady crevices which have a northern aspect. I have not been able to discover, after many enquiries, that glaciers which flow through mountain gorges into the lower country

are formed in any part of North America, though travellers who have crossed to California, Oregon, and New Caledonia, speak of hills clothed with perpetual snow; and the Copper River, which joins the sea opposite to the peninsula of Alaska, is said by Bäer, on the authority of Klimowskij, to issue from a solid mass of ice. Several passes which traverse the chain do not rise more than 6,000 feet above the sea level, and being free from snow in summer may be crossed in that season by pack-horses and even by waggons. The more northern of these passes have long been known to the fur-traders; the southern ones have lately been explored and used by the multitudes who have hurried from the United States to California in search of gold.

Up to the 60th degree of latitude the chain runs nearly parallel to the coast of the Pacific, and not far distant from it; the descent to the level of the sea is consequently rapid on the west,—a configuration which M. Guyot[36] has noted as peculiar to the New World, while in the Old Continent the short slopes are turned to the south, and the long ones towards the north. A large triangular corner, which belongs to the empire of Russia, and extends westward to Beering's Straits, has a different physical character, in the existence of a transverse series of active volcanoes, as we shall hereafter have occasion to notice; at present my remarks will be confined to the continent lying eastward of the mountains.

The width of the chain is stated at from forty to one hundred miles, and the central parts and peaks are said to consist of granite and other igneous rocks.

The eastern slope towards the Atlantic commences by a belt, formed mostly of sandstone, 150 miles in width, which rests on the shoulder of the chain, with an inclination of about 37 feet in the mile, in its descent from 8,000 feet above the sea, to 2,500. The more gradual slope of the great prairies, beginning at the last-named elevation, has a breadth of 700 or 800 miles, and retains in its descent the prairie character of a treeless, sandy, and moderately undulated, or, as it is locally named, "rolling" plain.

Most of the streams which cross the prairie flow through deep furrows, sunk abruptly below the general level; nevertheless the Mississippi, Missouri, and some of their larger tributaries have wider valleys, skirted by successive terraces and alluvial deposits. On the banks of all the rivers there are belts of woodland, and clumps of trees

that encroach on the prairie, intercepting grassy lawns, and producing remarkably fine park scenery, which is often enlivened by small lakes. In the interior of the prairie, however, water is scarce, and there is such a total want of wood, that for days together the traveller can find no other fuel than the dung of the bison. Near the mountains the soil is coarsely sandy, strewn with boulders, and sterile; farther eastward the sand is finer, and the boulders disappear, but they recur in numbers on the lower border of the prairie: they are also scarce or wholly absent over very extensive tracts of the rich alluvial deposits of the valley of the Mississippi, south of the Ohio.

The Mississippi drains the entire space between the Rocky Mountains and the Alleghanies or Apalachian chain, embracing thirty degrees of longitude. The whole of this vast water-shed may be considered as one valley, whose bottom, indicated by the channel of the river, has a southerly course, inclining slightly to the eastward. The length of the river, from its source in Itasca Lake, at an altitude of 1,490 feet above the sea, to Balize, on the Gulf of Mexico, has been estimated by Schoolcraft at 3,160 statute miles, following its windings, and may be stated in round numbers at 2,400 geographical miles in a straight line. The moderate hills and eminences of the country in which the river has its origin do not rise above the plane of the general eastern slope of the continent in the same parallel; and the general longitudinal descent of the great valley from Lake Itasca is at the rate of 10 inches in the mile for the upper half of the river, and for the other half of the way, or from St. Louis downwards, of only two inches and a half per mile.

As St. Louis is 500 feet above the sea, and about 600 geographical miles distant transversely from the western summit of the prairie slope (which has been taken at 2,500 feet above the sea), the lateral descent of the valley to the channel of the river in that parallel is 40 inches in the mile; but the sinuosities of the Missouri, a mightier stream than the one in which it loses its name, and of the other grand affluents of the Mississippi that drain the prairies, give a gentler inclination to their beds. The Illinois, Ohio, and the minor streams which come in from the other side of the valley, flow at a lower level than the western feeders; their upper branches being subordinate to the general slope, which has there descended considerably.[37]

From the Apalachian chain to the Rocky Mountains the fundamental

rocks would appear to be silurian[38] overlaid in large tracts by the old red sandstone and the carboniferous series. The sandstone, which rises on the flanks of the Rocky Mountains to the height of 8,000 feet above the sea, is referred by some geologists of the United States to the triassic system; but its exact geological position is not yet satisfactorily determined. Cretaceous beds, known by their organic remains (but not containing white chalk with flints), occur extensively along the Missouri, and spread widely on both sides of the Mississippi, below the influx of the Ohio. They exist also near the Rocky Mountains, high above the sea, in the vicinity of the sources of the Arkansas, Platte, and Gila[39]; while towards the mouth of the Mississippi there are very extensive recent tertiary and alluvial deposits, which, skirting the Gulf of Mexico, run into Texas on the one side, and along the Florida coast on the other.

Tertiary coal, containing dicotyledonous leaves, exists in the Raton Pass, between the sources of the Red River and the Arkansas, at an elevation of 4,600 feet. Coal of the same description, associated with similar leaves, occurs on the Mackenzie in latitude 65° N.; and at various intermediate parts on the flanks of the Rocky Mountains beds of lignite are known to exist, which are probably also of the tertiary era.[40]

In the whole width of the Mississippi basin, from the falls of St. Anthony downwards, no primitive (or hypogenous) rocks appear, except in the low ridges of the Ozark Mountains, which have a hilly prominence, owing to the excavation of the valley; but their summits scarcely rise above the plane of the general slope, supposing that it were extended with an even descent to the Atlantic. They range from Red River to St. Louis, parallel to the Alleghanies, and consequently make an angle with the Rocky Mountain chain. Coal measures crop out on their flanks.

Of the forty degrees of latitude which intervene between the Gulf of Mexico and the Arctic Sea, the valley of the Mississippi occupies, as we have seen, about one half; and the whole drainage of that portion west of the Alleghanies is accumulated in one great channel, which is directed southwards and a little eastwards. From the head of Lake Superior northwards, there is a series of great transverse excavations, occurring in succession, on to Great Bear Lake, which lies under the Arctic circle; and it is remarkable that nearly all the lake basins[41] of these valleys commence in the silurian strata, and are continued into or entirely across

a belt of primitive, or hypogenous, and metamorphic rocks[42], which extends from Lake Superior to the shores and islands of the Arctic Sea. The western limit or strike of this formation, which I have traced for more than 1,400 geographical miles, has a general course of north 30° W., its rhumb line, consequently, inclines slightly towards the axis of the Rocky Mountains, and the intercepted space grows narrower towards the north.

On the other hand, the Apalachian chain, running parallel to the Atlantic coast for a thousand miles up to its termination in the Shickshock and Notre Dame Mountains of the promontory of Gaspé, and having a direction of north 46° E., diverges from the Rocky Mountain axis at an angle of 72°. These are the three chief pyrogenous systems of North America, the Ozark Hills being of lesser account, and coinciding, as has been said above, in direction with the Alleghanies.

The middle belt of primitive rocks may, both from its position and diagonal direction, be distinguished as the *intermediate primitive or hypogenous* formation. Its altitude nowhere entitles it to the appellation of a mountain chain. Its hypogenous rocks, which are chiefly granite and gneiss associated with trap, scarcely rise above the mean eastern slope, and do not present acute peaks or continuous elevated ridges. They exhibit generally rounded or dome-shaped summits, or form oblong eminences, which are separated from one another by narrow inclined valleys. Most of these valleys, and the larger ones without exception, are occupied by lakes, which are often deep; and the proportion of water in the district is very great, probably considerably exceeding that of the dry land.

The rivers that traverse the intermediate primitive belt (and for ten degrees of latitude all the rivers that originate high on the prairie slope do so) form, on entering it, lake-like expansions, which are studded with rocky islets, and send long winding arras into all the neighbouring valleys. These dilatations have little or no current, but they are connected with each other by one or more straits, in which the stream is turbulent and rapid, and the overfall frequently great enough to produce a cascade. The tortuous arms of such expansions often wind for many miles through the country; and the Indian, by making short portages from one string of lakes to another, may travel with his canoe in every direction, as far as the formation extends. Sometimes a river forks in this rocky district, and its branches running far apart, just as they would in an alluvial delta, unite

again, intercepting a considerable tract of country of the prevailing character, that is, having a predominance of water surface. Examples of this peculiarity occur in the River Winipeg, which conveys the waters of the Lake of the Woods to Lake Winipeg; also in the discharge of the latter sheet of water by Nelson River and Play-Green Lake; as well as in some of the expansions of the Missinipi or Churchill River. Instances also of lakes having more than one outlet are not rare in this formation; and now and then, though comparatively very seldom, these outlets lead to distinct river systems.

On the east side of Lake Winipeg the width of the primitive belt is about two hundred geographical miles; and from the summit of an eminence which rises only a few hundred feet above the general level, but yet is sufficiently conspicuous to have obtained the distinctive appellation of "the Hill," thirty-six lakes may be counted. In many localities, where the knolls are denuded of soil, the surfaces of the rocks are evenly ground down, and are sometimes smooth, polished, and striated.

By a rough measurement, the centre of this formation on the 53rd parallel of latitude is found to be between 700 and 800 geographical miles from the Rocky Mountains; the Great Canadian Lake district is of equal width; and Labrador on to Newfoundland and the eastern shores of Nova Scotia occupy a similar space in the map. Now assuming, as we have done, and as the observations of the topographical surveyors of the United States entitle us to do, that the height at which the gentle eastern slope of the continent commences is 2,500 feet, and supposing the descent to be equable, we should have an altitude above the sea in the country from whence the sources of the Mississippi proper, the St. Lawrence, and the Red River of Lake Winipeg issue, of 1,800 feet. The actual elevation of that district is between 1,400 and 1,500 feet[43], and the only marked hilly eminence in the district, which is named the *hauteur des terres*, and is said to consist of drift-sand and boulders, does not appear, from the descriptions we have of it, to rise more than 300 feet beyond the general level. The summits, therefore, of this tract of land, distinguished though it be by shedding its waters into three separate river systems and as many different seas, are also subordinate to the general eastern slope of the continent.

Before naming more particularly the transverse basins which cross the intermediate belt of primitive rocks, I may state that the Mackenzie,

inferior indeed to the Mississippi, but yet a river of the first class, running in an opposite direction, drains seventeen degrees of latitude into the Arctic Sea, taking its course through a valley which differs in its character from that of the Mississippi, as the details of progress of the expedition through it have already shown. In this place it will be sufficient to recall to mind that from Methy Portage (*Portage la Loche*) to the sea, a distance of 1,400 geographical miles, the fall is about 900 feet, the successive portions of the river being designated the Washacummow, Elk or Athabasca, Slave, and Mackenzie Rivers.

Two other rivers of magnitude cross the Arctic circle, viz., Back's Great Fish River, which, originating near Great Slave Lake at an altitude of 150 feet above its surface, runs east-north-east into the Arctic Sea, draining the north-eastern corner of the continent; and the Yukon, which, rising to the westward of the Rocky Mountains, not far from the union of the Francis and Lewis, which form the Pelly, flows first to the north, and after receiving a large tributary named the Porcupine, to the westward, falling into Beering's Sea, where it is known to the Russians by the name of the Kwichpack.

A glance at the map will show, that on the eastern side of the continent the water basins generally maintain the north-easterly inclination of the Alleghanies, while further to the westward the basins of the two great rivers assume a parallelism to the Rocky Mountains; and that the influence of the intermediate hypogenous formation has been of a different character, the rivers winding their way across it, sometimes with a southerly, sometimes with a northerly inclination, seemingly indicating the obstruction offered by the harder rocks to the agent by which the river channels were excavated. On emerging from the belt, the lower parts of the rivers generally incline towards the north-east, with a considerable degree of parallelism to each other before they fall into Hudson's Bay.[44]

The peculiar configuration of the continent which I have endeavoured to sketch must be duly considered by any one who endeavours to detect the agency by which the river valleys and lake basins were excavated. It is not, however, my purpose to enter upon the discussion of this question, or to speak of the partial and often repeated elevations and depressions by which the lacustrine and fluviatile terraces have been accounted for; nor would a summary of this kind admit of the necessary elucidations. I

shall merely say that, adopting the opinion of the United States' geologists, that they are basins of excavation, I consider them all to be of the same epoch, and that the currents or waves of translation, if such they were, must have had an easterly direction in the middle latitudes, and gained strength as they rolled towards the Atlantic, when they swept away wholly or partially the fossiliferous deposits that once covered the primitive rocks of Hudson's Bay, Canada, and the eastern parts of the United States; the former extent of the newer rocks being indicated by the patches which remain. By a singular coincidence of a political with a natural limit, the northern boundary of the United States, or the 49th parallel, marks the line on the great prairie slope, where the current took a southerly direction, to excavate the wide and magnificent valley of the Mississippi. A similar diversion of the excavating force northwards would produce the basin of the Mackenzie, commencing on the 53rd parallel, but in a district narrowed and disturbed by the approximation of the intermediate primitive rocks to the Rocky Mountains.

Supposing the continent to have retained its present form since the era of these excavations, it seems scarcely possible to reconcile the existence of extensive glacial action with any modification of climate; yet the smoothened surfaces, streaks, and furrows referred to that action, whether in the form of glaciers or of drift ice, are of no rare occurrence, wherever durable rocks show themselves, between the St. Lawrence and the Arctic Sea.

In connection with the excavations of the North American continent, the fact may be mentioned of the great indentations of the coast line, including Hudson's Bay, the Gulfs of St. Lawrence and Mexico, and the Caribbean Sea being on the east side; while breaks of the west shore, to the south of the peninsula of Alaska, are comparatively small, and both coasts of South America are nearly entire.

The geologists of the New York Survey consider that the present continent of North America was constructed from the debris of land lying more to the eastward. Mr. Hall, speaking of the strata exposed between the Hudson and the Mississippi, states that they contain organisms which must have lived in the bed of the ocean, and that the chief source of the sedimentary deposits lay to the east and south-east. To the westward, the sedimentary rocks are of a finer grain, and at the same time diminish in quantity, while the carbonate of lime increases, indicating, in

conjunction with the contained fossils, the bottom of an ocean of greater depth and more quiet condition. The cretaceous and tertiary deposits of the western prairies show, according to the geologist just quoted, that the eastern part of the continent was first elevated, and that the older rocks in the west were subsequently overlaid by the new deposits. However that may be, the occurrence of the chalk fossils and tertiary deposits in their present position and altitude clearly indicates that the elevation of the Rocky Mountain chain was one of the latest of the great movements that have occurred in this continent. It is to the westward of these mountains only, along the Pacific coast, and in the peninsula of Alaska[45], and the Aleutian chain of islands, that recent volcanic action can be traced.

The existence of coal measures, containing ferns and other plants of a tropical character, in Jameson's Land and Melville Island, in the high latitudes of 71° and 75°, is a curious fact, to be accounted for by those who theorise on the ancient condition of the surface of the earth; and the vast accumulations formed at a later epoch in the Siberian Sea and Kotzebue's Sound, of fossil bones of mammoths, rhinoceri, and other animals which do not exist in arctic regions at the present day, and the preservation to this date of some of their undecomposed carcases, are equally interesting facts, which need explanation.

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[35] Supposed to be at least 3,000 feet high, in the 62nd parallel.

[36] Phys. Geogr., p. 50.

[37] The following facts, ascertained at the Navy Yard of Memphis, in Tennessee, by R. A. Marr, Esq., are interesting points in the history of the Mississippi. The quantity of water passing through the channel of the river at that place in 1849 was sufficient to cover an area of 100,000 square miles to the depth of seven feet and a half, and the quantity of silt it carried down would make a bed of earth one mile square and seventy-six feet deep. The current in the central area of the river generally exceeded three miles an hour,

and was less towards the sides.—*Proceed. Amer. Assoc.*, p. 340.

[38] As the silurian rocks are most extensively developed in North America, and are of constant recurrence throughout the route of the Expedition, I shall introduce here, for reference, a tabular enumeration in the order of their superposition, as ascertained by the United States geologists, beginning with the lowest.

A. Champlain Division; supposed to underlie three-fourths of the territory of the United States, and to occupy the surface of one half.

1. *Potsdam sandstone*; a quartzose rock, generally grey, often striped, sometimes partially or wholly red: is supposed to be the lowest sedimentary fossiliferous rock. The *Taconic rocks* of Dr. Emmons, consisting of lamellar white limestone, with specular iron ore, are supposed to be the earliest deposits of this period, modified by metamorphic agency. Footmarks of reptiles have been found by Mr. Hunt in this sandstone.
2. *Calciferous sandrock*; a deposit of calcareous and earthy matter variously mixed.
3. *Black river or Chazy and Birds-eye limestone*; a brittle limestone, having a smooth, flat-conchoidal fracture. This limestone, characterised by its peculiar fossils, is of frequent recurrence northwards, up to the islands of the Arctic Sea.
4. *Trenton limestone*; a dark-coloured

limestone, interlaminated with dark shaly matter. Often metalliferous.

5. *Utica slate*; dark-coloured carbonaceous slates, which readily disintegrate.
6. *Hudson River group, Loraine shales, Frankfort slate, and Rubblestone*; mostly dark slates and shales, and grey thick-bedded grit stones.

B. Ontario Division, includes a series of limestones, shales, and sandstones, which pass insensibly into each other.

7. *Grey sandstone* of Oswego.
8. *Medina sandstone*; red or slightly variegated, and of every degree of coherence. Originates many brine springs.
9. *Oneida conglomerate*; a variable intermixture of sand and quartz pebbles.
10. *Clinton group*; consisting of deposits of various characters, such as thin shaly sandstones, shales, conglomerates, thin-bedded impure limestones, with iron ores.
11. *Niagara group*; consisting of dark-bluish shale and dark limestone, and taking its name from the cataract, where a section of both its members is exposed.

C. Helderberg Division.

12. *Onondago salt group*, is an immense development of argillaceous shales

and marls with shaly limestones, veins and beds of gypsum, giving origin to copious and very rich salt springs. This formation re-appears near Slave River, on the 60th parallel of latitude, and also, I believe, on the shores of the Arctic Sea.

13. *Water-lime group*, consists generally of two layers of drab-coloured water-limestone, with an intervening layer of blue lime-rock.
14. *Pentamerus limestone*; named from its characteristic fossil, and rarely a pure limestone, being more or less mixed with black shale.
15. *Delthyris or Catshill shaly limestone*; composed of beds of sub-crystalline grey limestone, slaty limestone, and slaty argillaceo-siliceous limestone.
16. *Oriskany sandstone*; a whitish sandstone, composed of sand derived from granitic rocks or mica schist.
17. *Caudagalli grit*; named from the feathery forms in which it abounds. It is a drab-coloured or brownish calcareous and argillaceous sandstone.
18. *Shoharie grit*; a fine-grained calcareous sandstone, from which the calcareous matter may be washed away by long exposure, leaving the siliceous skeleton of the rock.
19. *Onondago limestone*; recognisable by its crystalline structure, toughness, and numerous organic remains.
20. *Corniferous limestone*; a fine-grained

compact limestone, which is very durable, and produces cascades where the smaller streams traverse it. It is the uppermost of the important limestone beds of the New York or silurian system, being succeeded by shales in which the limestone fossils give place to others of a different character.

D. Erie Division, referred by most English geologists to the Devonian or to the carboniferous series.

21. *Marcellus shales*; black, slaty, bituminous shales, containing septaria, with occasional thin bands of limestone. Similar in lithological characters to Genesee slate.
22. *Hamilton group*; an immense deposit of dull-olive calcareous shales, which change to light ash-grey in weathering. It contains septaria.
23. *Tully limestone*; usually thick-bedded, blue, or nearly black, limestone, often divided by seams into irregular fragments.
24. *Genesee slate*; is a great mass of argillaceous, black, fissile slate, which rapidly exfoliates and falls down. Fluid bitumen is of common occurrence. Either this deposit or No. 21. exists on the north side of Methy Portage, on the Elk or Athabasca river.
25. *Portage group*; a vast deposit of shale, flag-stones, and thick-bedded sandstone, rising with a slope or abruptly from the shales on which it

reposes.

26. *Chemung or Ithaca group*; a highly fossiliferous series of shales and thin-bedded sandstones.

To the last succeed the Old Red Sandstone and the Coal Measures.

The lower part of the Champlain division has been considered as the equivalent of the Cambrian system, the *Utica slate* being parallel to the *Landeilo flags*; the *Hudson River group* and Ontario division, up to the *Niagara group*, is thought to be equivalent to the *Caradoc sandstone*; the *Niagara group* and the whole Helderberg division is supposed to be co-equal with the *Wenlock rocks*; and the Erie division as equivalent to the *Upper* and *Lower Ludlow rocks*, including the Devonian system of Phillips.—*Vide Hall, Geol. Report of New York*, p. 518.

[39] "The cretaceous formations terminate in the Atlantic regions of New York, before they have reached the city of New York, so that their limit scarcely touches the 40th degree of latitude, or 16° lower than in Europe. In Kentucky and Tennessee it remains below 37°, but it is very different far up the Missouri; this great river flows uninterruptedly from the foot of the Rocky Mountains for 1,400 miles through strata of chalk, at least as far as the Sioux river. This is the result of the researches of the Prince of Neuwied, and of the reports of the celebrated astronomer, Nicollet. In these western parts of America the chalk rises to 50° of latitude. There, also, it shows a continuous extension, greater than that of any other formation on the globe. Captain Fremont saw chalk strata and fields covered with *Inoceramus crispii*, on the River Platte; Lieutenant Abert found them on the Arkansas, and Dr. Wizlizenus also beyond the

Rio del Norte, near Monterey and Laredo. The Rocky Mountains, and their continuation beyond Santa Fé, have entirely cut off this cretaceous sea. No trace of chalk was discovered either by Captain Fremont on the Columbia River or on the Humboldt, in that wonderfully great basin which dips to the Pacific; or yet by the observant Captains Cooke and Johnstone along the River Gila, in Sonora, or California." "The whole of this vastly extended chalk formation consists only of the upper beds. After very careful and accurate investigation, Sir Charles Lyell decided, that in the whole of North America, chalk strata, from the Maestricht beds down to the gault, alone occurred; and Mr. Ferdinand Römer, as the result of his highly valuable and accurate researches in Texas, goes the length of considering all the strata in that region, already so far removed from the Atlantic coast, as entirely of the upper division, and not even touching on the gault. This peculiarity is, however, singularly enough, limited to North America alone. Even in Mexico deeper chalk beds occur; and Darwin saw cretaceous shells in abundance 2,000 feet above the sea, near Port Famine, in 53° south latitude."—*Silliman's Journal*, Sept. 1850.

[40] Vide Journ. p. 194.

[41] This grand series of lakes forms the line of canoe navigation from Canada northwards; and the fact of its position in the fracture between limestone and granite, was perceived and recorded by Sir Alexander Mackenzie.

[42] My imperfect acquaintance with the science of geology renders me incompetent fully to appreciate the worth of the several systems that profess to explain the mode in which the beds forming the crust of the earth have been formed; neither have I exclusively adopted any of the current opinions: I

would therefore be understood to use the terms "primitive," "hypogenous," and "metamorphic," as designations of the rocks so called by geologists, and not as exponents of theories.

[43] Schoolcraft estimates the height of Itasca Lake, from which the Mississippi issues, at 1,490 feet above the Gulf of Mexico. Major Long, who ascended the St. Peter's, a head branch of the Mississippi, reckons the altitude of the short portage, which separates its sources from those of Red River, at 1,400 feet; and my own barometrical observations and estimates place the summit of the water-route between Lakes Superior and Winipeg, traversed by the Expedition, at 1,400 feet above the tide level of the St. Lawrence.

[44] A study of the map will show, that the lake basins north of the St. Lawrence have generally their long axes across the river courses to which they respectively belong, and that many assume a greater or less degree of parallelism to the intermediate primitive belt. Perhaps movements of elevation or depression had occasioned an extensive disruption of strata along the western border of the hypogene rocks, previous to the removal of the silurian beds on the excavation of the lake valleys.

[45] Spelt thus, and also *Alashka* in Cook's Third Voyage. The French and Russian authors write the word *Aliaschka*.

VALLEY OF THE ST. LAWRENCE.

The first in order of the great transverse excavations, and the grandest, is the basin of the St. Lawrence, which has a length equal to the whole course of the Mackenzie, and contains by far the greatest accumulation of fresh water in the world. It has no connection with the drainage of the prairie slopes in the same parallels, which is performed by the Missouri and its numerous affluents on one side, and on the other by the Saskatchewan and its tributaries, aided by the upper feeders of the Mackenzie. It differs from the three great lacustrine basins which succeed it, in its head lying within or to the eastward of the termination or elbow of the "intermediate primitive rocks." The position of this head, or as it is well named from its elevation above the other members of the basin, Superior Lake, is midway between the Gulf of Mexico and the Arctic Sea, and its water-surface is 641 feet above the level of the tide.[46] The other great lakes descend successively in the following order of their heights above the sea: Lakes Huron and Michigan, 600 feet; Erie, 565 feet; Ontario, 492 feet; and Lake Champlain, 93 feet.

At the west end of Lake Superior, and on its northern shores, several promontories, having an altitude of from 800 to 1000 feet above the water, give a mountainous character to the coast when seen from the surface of the lake, but which it is far from possessing when viewed in relation to the country lying behind it. It is such as would result from the excavation of the basin by the removal of the softer rocks which have covered the granites, porphyries, and traps of these eminences. The silurian beds, not having been so extensively broken up to the westward of the *Fon du lac*, envelop the pyrogene nucleus so as, in conjunction with recent arenaceous deposits and drift, to cover it on that flank almost to the summit. From this locality, which is rather a plateau than a mountainous district, issue the feeding streams of the three several river systems,—of the Mississippi, St. Lawrence, and Saskatchewan,—as has been mentioned in a preceding page.

If we trace the south side of the St. Lawrence basin from this quarter, we find that already on the upper lake it assumes a different aspect, being composed chiefly of sandstone, and having less elevation than the north bank. Lake Michigan runs far to the southward among the silurian strata, entering as it were into the valley of the Mississippi. So small is the

elevation of the ground between the Fox River which falls into Green Bay on the west side of that lake, and the Wisconsin, a tributary of the Upper Mississippi, that in times of flood a barge may float readily from one stream into the other.[47] A very moderate elevation in like manner separates the south end of Lake Michigan from the Illinois, another affluent of the Mississippi, so that a depression of 600 feet would produce a communication between the waters of the Gulf of the St. Lawrence and those of the Gulf of Mexico, through the Illinois valley.[48] The basin of Lake Huron is excavated in the silurian strata, and the great promontory which divides it from Lake Michigan is said to be a deposit of old red sandstone enclosing the extensive coal measures of Saginaw. The lake shores are bold, but not mountainous.

Lake Erie has lower shores, and is the shallowest of the series. Its bed and much of its northern margin is formed of the corniferous limestone, one of the upper members of the silurian rocks. Mr. Hall remarks that, had the eroding agency removed this bed, and penetrated to the soft strata of the Onondago salt-group, Erie would probably have been the deepest of the lakes.[49] The southern brim of its basin is so low, that an easy canal communication has been opened to the Ohio, a tributary of the Mississippi; and other water connections might be made with facility. Lake Ontario occupies a hollow in the silurian rocks inferior to those of the Erie basin[50]; and the country which lies to the south of it has in general a level character, though the Clinton and Niagara groups of rocks rise in places in high escarpments.

For a full account of the heights of the southern border, the whole valley of the great lakes and the St. Lawrence, and for detailed descriptions of the rock formations, the reader may consult the several geological surveys published under the authority of the legislatures of New York, Michigan, and Ohio: the preceding brief notices have been extracted therefrom for the purpose of showing the general character of the country, and the lowness of the barrier which separates the valleys of the Mississippi and St. Lawrence. I may add, as a further exemplification of the passes on the south side of the St. Lawrence, that a subsidence of 400 feet would cause the waters of Lake Ontario to flow through the valleys of the Mohawk and Hudson into the Atlantic, and at the same time convert Lake Champlain into a maritime strait, thereby forming

islands of the states of New York, New England, and Maine, and of the British colonies of New Brunswick and Nova Scotia.

Before we proceed to trace the northern bank of the valley of the St. Lawrence, it will be convenient to notice more particularly Lake Champlain, since it is there that we have an approximation of the Apalachian chain to the primitive rocks which form the northern brim of the St. Lawrence basin, and unite with the intermediate belt on the north shore of Lake Superior.

Dr. Emmons[51] estimates the length of the valley of Lake Champlain at 180 miles, and its average width at about 20. Its bed is most depressed between West Point, Burlington, and Port Kent, where its soundings reach 600 feet, or 500 below the surface of the ocean.[52] It is in fact a deep chasm with a very abrupt slope on the western side, and a more gradual one on the eastern bank. The direction of the lake is north and south; it opens into the St. Lawrence basin on the north, and the valley of the Mohawk crosses its axis at some distance on the south. The summit level of the canal which connects it to the Hudson is only 147 feet above the tide; and a depression to that amount would cause the waters of the ocean to flow through it from New York Sound into the Gulf of St. Lawrence.

The New York highlands, bounded by Lake Champlain, the St. Lawrence, and Lake Ontario, are formed of primitive granite, hypersthene, and limestone rocks, which constitute many striking and picturesque groups of conical peaks. Among these Mount Marcy rises 5,467 feet above the tide; Mount M'Intyre, 5,183; Mount Seward, 5,100; Mounts Martin and Santanoni, each 5,000; and Whiteface, Taylor's Mountain, and Nipple-top are a few hundred feet lower. These highlands extend into Canada, where they form a mountain belt twenty-five or thirty miles wide, along the sources of the Chaudiere and St. Francis.[53] They are separated from the neighbouring districts of the state of New York by the river and lake valleys named above; and, being impassable for an army, Lake Champlain was the only route by which the Atlantic states could be assailed from Canada East, or *vice versâ*;—hence the celebrity of its defiles in the annals of colonial and revolutionary warfare.

The valley of the lake is excavated in the lowest group of the silurian

rocks. The Potsdam sandstone, together with a greenish-white marble, and a trap rock, are quarried extensively at Whitehall, situated at the upper extremity of the lake, for the double purpose of clearing sites for houses, and procuring building stones. In various parts of the lake shores, the silurian rocks are covered with beds of clay and sand, in which there have been detected about twenty species of marine shells, which exist in a living state on the coast of the Atlantic at the present time. The general character of the scenery, and especially of the upper half of the lake, is bold, hilly, and picturesque, often rocky, but occasionally cliffs of clay and sand 100 feet high border on the water. The shores are low and shelving only in the bays, which are formed by short lateral valleys.

The state of Vermont lies along the east side of the Champlain Valley; and the country, as it recedes from the lake, rises gradually into the acclivities of the Green Mountains, which are a continuation of the Alleghanies, and are prolonged into the Shick-Shock and Nôtre Dame Mountains of the promontory of Gaspé on the Gulf of St. Lawrence.[54]

The predominating rocks on this slope are an alternation of argillaceous slates, with slaty and fine-grained sandstones, and shaley grits belonging to the Hudson's River group. In breaking down, the shales produce a cold, clayey, retentive soil, much less favourable for agricultural purposes than the "birds'-eye" and other limestones which crop out nearer the shores of the lake.[55]

With respect to the northern slope of the St. Lawrence valley, a reference to the map will show that the brim of the basin, where its feeding streams have their source, is generally about 150 geographical miles from the centre of the lake-way from Ontario upwards, and considerably further off from the river channel lower down. The bays of the great lakes, in many places, curtail the breadth of the slope; and it is every where exceeded in breadth by the northern slope towards Lake Winipeg, James's Bay, and Hudson's Straits. It will also be perceived that the valley, with reference to its northern bank, makes an acute bend, of which the west end of Lake Erie forms the elbow; the lower or eastern arm being parallel to the Alleghany range, while the upper one takes more the direction of the axis of the Rocky Mountains. The angular form of the basin is in conformity with the course of the primitive rocks from Labrador to Lake Superior, where they blend with the "intermediate

belt."[56] The general level of the ridge formed by these rocks does not exceed the height of 700 feet above the river or lake surface; but, partaking of the general eastern slope of the continent, it attains a height of about 1,400 feet above the sea on the north side of Lake Superior.[57] The course of the St. Lawrence through Canada East is conformable to the general strike of the beds in which the channel is excavated.

The geological structure of the north side of the St. Lawrence basin, as ascertained by the Canadian state survey under Mr. Logan, has been summed up as follows by his assistant, Mr. Hunt:—"A formation of syenitic gneiss, often passing into mica-schist, and interstratified with crystalline limestone, forms a ridge of high land extending from the coast of Labrador along the north side of the St. Lawrence, at a distance of from twelve to twenty miles from the shore, until it crosses the Ottawa, near Bytown, and thence is traced across Lake Simcoe to the shores of Lake Huron, where its northern limit is observed near the mouth of the French River, while it again appears at the south-eastern extremity of the lake in Matchedash Bay. Resting upon this is a series of rocks forming the whole north coast of the lake, and numerous small islands. It is made up of sandstones, often coarse-grained, and sometimes becoming conglomerate from the presence of red jasper pebbles. These beds are associated with slates and one or more bands of limestone. . . . The formation is much cut by greenstone dikes, and exhibits very frequently interstratified beds of greenstone, often of great thickness. Both these and the sedimentary rocks contain metalliferous quartz veins, of which the copper mines of this region are examples. Resting uncomformably on the tilted edges of this formation, and in other places directly upon the southern limit of the syenitic gneiss, appear the silurian rocks, identical with those which are found in New York, and covering the peninsula between Lake Huron and Lake Ontario. Beginning with the *Potsdam sandstone*, we have, upon the Manatoulin Islands and the coast between Matchedash Bay and Sarnia, a complete exposure of those formations known as the *Trenton limestone*, *Utica slates*, *Loraine shales*, *Medina sandstones*, and the *Niagara limestones*, with the rocks of the *Clinton group*. All these are well characterised by their respective fossils, and are spread out quite undisturbed at a very gentle dip of about thirty-five feet in a mile.

"Passing to the east, we find that the syenitic rocks have divided

where they cross the Ottawa, and, taking a southward course, are spread over a considerable extent of country between the Ottawa and the St. Lawrence. Crossing this river below Kingston, they constitute the greater part of the Thousand Isles[58], and are extensively developed in the northern counties of New York."

Mr. Logan gives a more particular account of the north shore of Lake Huron, of which I have made the following abstract:—"The north shore of Lake Huron, on which twenty-two mining locations have been claimed of Government, presents an undulating country rising into hills which sometimes attain the height of from 400 to 700 feet above the lake. These occasionally exhibit rugged escarpments and naked rocky surfaces; but, in general, their summits are rather rounded, and their flanks, with the valleys separating one range from another, are most frequently well clothed with hard and soft wood, often of large growth, and of such species as are valuable in commerce, in many places giving promise of a good arable soil. Many of the slopes are gentle, and many of the valleys wide. The Thessalon, of the reported length of 200 miles, and the Spanish river of 120 miles, flow through this country, with three other rivers of from 50 to 60 miles' length each." With respect to the rocks occupying this country, he says, that "for 120 miles from the upper end of the lake one great formation, having a breadth in some places of ten and in others exceeding twenty miles, exists. It is composed of sandstones, conglomerates, slates, and limestones; the sandstones often vitreous, and presenting the character of a perfect quartz rock. These are associated with greenstone trap and other igneous rocks, in the form of overflows, dykes, and veins, and with amygdaloidal trap in layers. The whole reposes on granite, which is the metalliferous rock of the district, and lies beneath the lowest known fossiliferous beds. The Potsdam sandstone, Trenton limestone, Utica slates, and Loraine shales are exposed in successive deposits, resting on the tilted beds of the quartz rock in a nearly horizontal, unconformable position in the Grand Manatoulin, La Cloche, Snake, Thessalon, Sulphur, and other islands, and at the east end of the lake. Medina sandstone and Niagara limestones exist in certain localities of the promontory of Cabot's Head."

Of the mining places above alluded to by Mr. Logan, the Bruce mines, situated on the main shore behind the island of St. Joseph, are the principal; and, in 1849, when I was returning to Canada in the month of

September, and had an opportunity of visiting them, 160 people were there employed, forming, with their families, a considerable village population. Mr. Logan calculated that 250 tons of dressed ore might be raised monthly, yielding, at an average, about 15 per cent. of copper. At present, fuel for mining purposes is obtained from the Pennsylvania coal-field, through the port of Cleveland, on Lake Erie; but, ere long, the coal district in Saginaw Bay, on the south side of Lake Huron, will become the smelting place for both the Huron and Lake Superior minerals.

To complete the outline of the north bank of the St. Lawrence valley, we may state that the primitive rocks continued from Lake Huron to the outlet of Lake Superior, form there the bold promontory of Big Cape (*Gros Cap*), which is a mass of flesh-coloured granite and porphyry rising 700 feet above the water. Point Iroquois, on the opposite side, three miles distant, is 600 feet high, has a more table-shaped summit, and from its base a line of low sandy beach stretches away on the south side, sending out a projecting tongue named "White-Fish Point." The north shore, as seen from Big Cape, presents a grand and finely varied coast line, deeply indented by Goulais and Batchewaung Bays, with the promontory of Mamainse, composed of rugged and crumbling amygdaloid, dipping into the wide expanse of waters on the north-west. The granitic ridge which skirts the bottoms of these bays comes out in bold cliffs on both sides of Michipicoten Bay, at the Otter's Head, and at the bottoms of Nipigon and Thunder Bays, projecting also in various capes between them. From the last named bay it stretches across the northern bend of the Kamenistikwoya River, by which stream the canoe navigation to the interior is carried on.

Mr. Logan considers the granite, which frequently passes into gneiss, as the base of the series of rocks composing this bank of the lake. 2. To this succeeds gneiss, and both are traversed by dykes and veins of granite. 3. The next in order are dark green talcose slates, and a pebbly and slaty conglomerate. 4. Resting unconformably on these, is a series of bluish shales, interstratified with trap. 5. Lastly, white or spotted sandstones, indurated marls, and conglomerates interstratified with trap. Trap dykes in vast numbers traverse all the beds down to the granite. Veins containing copper, lead, zinc, and silver, belonging to two systems, —one coincident with the rock masses, the other parallel to them,— occur in very many places on the north shore. The courses of the veins

vary in different bays, and Professor Agassiz has shown that the outline of the lake has a close connection with the directions of the trap dykes, of which he describes six different systems, each of them associated with one of the great curvatures or bays.

A granite porphyry, which is very durable, forms a considerable portion of the boldest and most barren parts of the north shore of the lake; the projections of amygdaloid, being more perishable, assume the most picturesque shapes; and some of the loftiest headlands are thickly capped with greenstone, basalt, and other trappean rocks. The low, flat, well-wooded islands are mostly sandstone. The general elevation of the northern brim of the Lake Superior basin may be stated at between 800 and 900 feet above the water surface, and the distance of its crest from the margin of the lake at from 20 to 50 miles.

Many mining stations have been granted to adventurers by the Canadian legislature, but workings are carried on in three only; viz. one in Pigeon Bay, one among the islands of Nipigon Bay, and the third in Mica Bay. At the last named 100 miners were employed in 1849, when the establishment was broken up by a foray of Chippeways, who thought that their territorial rights were invaded.[59] But little ore has as yet been shipped from the Canadian side of the lake. The export of native copper from the United States shore is considerable. In 1849 1,114 tons of pure copper were transshipped at Saut Ste. Mary.[60]

Our limits will not allow us to dwell longer on the St. Lawrence basin[61]; but with respect to the general character of the ridge which divides it from the Winipeg excavation, the aspect of the country traversed in pursuing the canoe route may be considered as a type of the whole. The surface of that tract is hilly, the granite rising in rounded and sometimes in rugged knolls abruptly from lakes or swamps, but only to small heights above the general level. Here and there, but particularly towards the summit of the ridge, there are considerable deposits of sand, gravel, and loam, with many boulders. The term ridge is used with reference to its being a height separating two depressions; but its summit is a marshy plateau of some extent, across which narrow winding lakes afford a canoe navigation in a variety of directions.[62]

This summit of the water-shed, which, level as it is with respect to its water communications, is rendered very uneven by the protrusion of

numerous granitic masses to various but moderate heights, lies much nearer to Lake Superior than to Lake Winipeg; and in descending towards the north, the same rocks appear in succession which have been noticed as forming the bank of the St. Lawrence valley, the "birds'-eye limestone" of the Champlain division of the New York system being the newest deposit on the Winipeg Lake.

If we trace the water-shed to the south-west, beyond the head of Lake Superior, by the sources of the St. Louis and head waters of the Mississippi, the uneven marshy surface gradually merges in the sandy prairie lands of the Red River, the Saskatchewan, and Missouri, where the naked rocks disappear, or are to be found only in the deep river channels.

The manner in which an elbow of the "intermediate primitive rocks," which form the nucleus of the water-shed here spoken of, encloses the head of Lake Superior, and extends along part of its south coast until lost under newer deposits, may be learned from the subjoined extract of a "Report by Dr. Owen, geologist to the States of Iowa and Wisconsin."[63]

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[46] Some discrepancy exists between the heights assigned to this lake by different authors. We have taken that deduced by Captain Lefroy from barometrical measurements made in connection with the observatory at Toronto. Dr. Houghton, the Michigan geological surveyor, estimates its height at 641 feet; but he makes the descent from it to Lake Huron 45 feet, while Professor Henry reckons this descent at only 18 feet, which must be under-estimated. Mr. Logan, in 1847, sets down the height of Lake Superior as 597 feet, having adopted for the height of Lake Michigan 578 feet, from Professor Henry. In the height of Erie and the inferior lakes authors are generally agreed.

[47] Featherstonhaugh.

[48] A depression of thrice that amount would carry the ocean to the western border of the prairie islands,

leaving, as insular ranges, the summits of the Alleghanies and their continuation in Vermont, New Hampshire, and Gaspé, with a few peaks in the hilly region of New York, which lies between Lakes Ontario and Champlain; while the primitive masses on the north of Lake Superior would be mere reefs, over the highest of which an agitated sea would dash its spray.

[49] Hall, p. 408.

[50] In the Medina sandstone, grey sandstone, the Hudson River group of shales, and, towards its eastern extremity, in the Trenton limestone.—*Hall.*

[51] New York Geol. Survey.

[52] The lake lies, as has been stated in a preceding page, 93 feet above the tidal waters of the St. Lawrence: hence the fall of the St. John or Richelieu River, which discharges its waters just above the tidal level, may be estimated at 10 inches in the mile; and the descent of the St. Lawrence from Lake Ontario, excluding the comparatively currentless expansions of the Thousand Islands' Lake and Lake St. Francis, is nearly in the same ratio. These facts may aid in the calculation of the inclination of the beds of similar rivers. With the same view, I may add that the fall of the St. Lawrence between Kingston, at the outlet of Lake Ontario, and Montreal is 220 feet, in a distance of 160 geographical miles in a straight line, of which a considerable part is lake-way, which gives an average of 16 inches in the mile.

[53] Orford and Sutton Mountains are each reckoned at more than 4,000 feet high. The latter is the summit of a wide hilly tract, composed of chloritic and micaceous schists and gneiss.—*Hunt*.

[54] Mr. Hunt, of the Canada geological survey, says that "the whole of the Green Mountain Rocks belong to

the Hudson River group, with the possible addition of a part of the Shawagunk conglomerates. The fossiliferous rocks of the St. Francis valley are referrible to the Niagara limestones of the upper silurian beds: a similar formation exists at Gaspé, and has been traced 150 miles south-west (in the direction of the Green Mountains); and from the similarity of Nôtre Dame (Gaspé) to the Green Mountains, and the fact that the Hudson River rocks flank the St. Lawrence to Cape Rosiere (Gaspé), we may conclude that the upper silurian rocks will be found to be nearly continuous throughout. Resting upon this formation, in Gaspé, is a body of arenaceous rocks, 7,000 feet thick, which apparently correspond to the Chemung and Portage group of New York, with the old red sandstones. As this formation is found extending quite to the Mississippi, it is probable that it will accompany the silurian rocks through New England, surrounding the coal-fields of New Brunswick, and of eastern Massachusetts, and Rhode Island. To this may be referred, in part, the rocks of the White Mountains, which may sweep around the western border of Massachusetts' anthracite formation, until lost under the super-carboniferous rocks of the Connecticut River. The limestones of western New England seem to be no other than the metamorphic Trenton limestones of Phillipsburg; while the chlorito-epidotic rocks and serpentines of Sutton valley appear again in the rocks of southern Connecticut, between these limestones and the new red sandstone. With such a key to the structure of the metamorphic rocks of New England, and of the great Apalachian chain of which these form a part, we may regard the difficulties that have long environed the subject as in a great degree removed, and the bold conjectures as to their metamorphic origin, which have been from time to

time put forth, fully vindicated."—*Hunt, Proceed. Am. Assoc. at Cambr.*, 1849, p. 333.

[55] During our voyage through Lake Champlain, I was informed by a fellow-passenger that the agriculture of Vermont was very superior, especially near Burlington, where there are many large orchards, and sheep farming is extensively pursued. Cleared land, he told me, sells currently at forty dollars (8*l.*) an acre, and fifty dollars are thought to be a high price. Two hundred acres form a good-sized farm in the opinion of the neighbourhood, and eighteen hundred acres a very large property. Many steamers are constantly employed in summer in visiting the various bays of the lake, and carrying the produce to Whitehall, whence it is transferred by canal to the Hudson.

[56] The whole belt from the Labrador coast, along the valley of the St. Lawrence, and northwards to the Arctic Sea, seems to be a segment of the border of a great basin of which Hudson's Bay is the centre, and fragments of its eastern brim may be found on the shores of Hudson's Straits, and in the islands to the north.

[57] The following ascertained points may be noticed:—Lake Temiscaming, which is high up on the Ottawa, and near the line dividing the water-shed of that river from the Abitibbe and Moose River, which falls into Hudson's Bay, was ascertained by Mr. Logan to be 612 feet above the tide. The dividing portage between the Ottawa and Lake Nipissing is 696 feet above the sea, the lake itself being, according to Mr. Murray, 647 feet high. Lake Simcoe was ascertained, by the same observer, to have an altitude of 704 feet above the tide.—*Logan's Geol. Rep. for 1848.*

[58] In the Lake of the Thousand Isles, as the funnel-shaped outlet of Lake Ontario is denominated, many of the round-backed hummocks of granite which form the innumerable islets exhibit the parallel furrows, streaks, and smooth surfaces attributed by some geologists to glacial action. This expansion, in fact, has exactly the aspect of many of the dilatations of the northern rivers which flow through the "intermediate primitive district."

[59] Narrative, Vol. I. p. 73.

[60] The Detroit Free Press states that, in 1850, the shipments exceeded 4,000 tons, and it is calculated that they will equal the whole consumption of the United States, which is 6,000 tons in 1851. There are twenty-two copper companies in operation on the Michigan shores, employing 800 men. The masses of native copper on Kewawoonan Point are enormous; but, from their very purity, they can neither be blasted nor hewn out in the ordinary way. The method adopted at present is to use long iron chisels, which are turned slightly by the hand at each blow of the hammer. In this way large slabs weighing two tons or more are cut out, to which not above five per cent. of quartz rock and other impurities adhere. On this point there are said to be parallel ridges of trap rising through beds of sandstone. Among these the native copper lies in walls or veins which have two directions, one running across the trap ridges in N.W. 6 N. ½ N. direction, the other parallel to the ridges and strike of the sandstone.

[61] Professor Agassiz has devoted a large volume to the natural history of Lake Superior alone, which is full of interesting facts and comprehensive general views.

[62] Vide map of the district in Franklin's Second Overland Journey.

[63] "The protozoic strata form sections on the Mississippi for an average distance, in a direct line, into the interior of Wisconsin, of from fifty to seventy-five miles, or up to the low falls of the principal eastern tributaries of that river, where the crystalline rocks first appear. In this part of the country the igneous ranges do not rise into elevated mountains, but, on the contrary, they are seldom seen except in the immediate cuts of the streams, being, for the most part, covered with drift. The character of the country generally, towards the summit levels leading to Lake Superior, is a succession of terraces of moderate elevation, chiefly composed of drift, having a nucleus, no doubt, of granite, syenite, or hornblende rocks; but these protrude only occasionally. At intervals the streams are ruffled into rapids, being filled with boulders which materially obstruct their navigation. A portion of these boulders may have been transported from great distances, but the greater part appear not to be far removed from their parent rock. It is a matter of surprise that so large an area of the interior of this district, and indeed of the sources of the Mississippi generally, should be level tamarack and cedar swamps, since, on approaching a great water-shed that gives rise to one of the greatest rivers in the world, one is led to anticipate a country with physical features of quite a different character. Interposed between the crystalline and igneous rocks of the interior of the district and the lowest sandstones, some green and red schistose beds have been observed at different localities. These appear to have been derived from the decomposition and detritus of the more easily disintegrating felspathic granites. The lower beds of sandstone adjacent to the igneous outburst are not unfrequently changed to hard quartzite." . . . . "The highest ranges of the Wisconsin side of Lake

Superior, situated from ten to sixteen miles from its south shore, are estimated to be near 1,000 feet above the lake, and are formed of hornblende rocks, metamorphic slates, syenite, and trap. No organic remains have been detected in the great mass of sandstone bounding this part of the lake whereby its geological era may be determined. On the west side of the Mississippi, north of the Winebago reserve (Minesota), and as far north as St. Peter's river, limestone, with underlying sandstone, prevails to the extent of half a degree of longitude."

VALLEY OF THE WINIPEG OR SASKATCHEWAN.

The next great transverse excavation includes the whole valley of the Saskatchewan and Nelson Rivers; and from the sources of the former near Mount Hooker, one of the Rocky Mountain peaks said to be 15,700 feet high, to the mouth of the latter in Hudson's Bay, the axis of the valley runs in a direct line about east-north-east for 660 geographical miles. Lake Winipeg, the principal lake basin in connection with the river, lies at right angles to that axis, is nearly parallel to the Rocky Mountain chain, and forms one of a series of great lakes succeeding one another in a north-north-west direction. Their names are Lake Superior, Lake Winipeg, Deer Lake, Wollaston Lake, Athabasca Lake, Great Slave Lake, Marten Lake, and Great Bear Lake; the northern coast line being moreover indented on the same bearing by Liverpool and Franklin Bays.

Lake Winipeg itself is 230 geographical miles long and about 40 wide, but its width would be increased to 120 miles, if Moose Lake, Muddy Lake, Winepegoos and Manitoba Lakes, which differ very slightly from it in level, and are evidently component parts of the same lake basin, were included in the measurement. Into this great lake the Saskatchewan, by its two diverging branches, gathers a wide extent of prairie drainage, its northern tributaries being conterminous with the affluents of the Elk or Athabasca River, and its southern ones with those of the Missouri. The Assinaboyn also traverses much prairie land, one of its branches originating on the banks of the great southerly bend of the Missouri; and the Red River, which the Assinaboyn joins, rises, as has been already mentioned, on the same level and in the close neighbourhood of the sources of the Mississippi and St. Lawrence. The waters of the lake wash, on the east side of the basin, the "intermediate primitive rocks," and find their way through them by anastomosing channels named Sea River, Katchewan, and in its lower part Nelson River. After it has passed through the intermediate belt, it takes its way over silurian limestones, and finally enters Hudson's Bay through alluvial deposits of some extent.

The surface of the lake has been calculated to be 853 feet[64] above the sea, and its basin is excavated in the silurian beds. Along the whole

eastern shore the granite, gneiss, and trap rocks are every where exposed, the first named rock being the most extensive; and nowhere do these masses rise to the altitude of hills. On the north and west the birds' eye limestone is the prevailing rock, and forms low cliffs, in a country otherwise every where flat; and towards the south end of the lake, and in the narrows, arenaceous deposits appear in the immediate vicinity of granite, trap-rocks, and chlorite slates, having a close resemblance to those of Pigeon Bay of Lake Superior, where argentiferous veins occur. It is, therefore, an interesting quarter for exploration by the practical miner.

In ascending from Lake Superior by the Kamenistikwoya, and its upper branch named the Dog River, to Thousand Lakes[65] (*Milles Lacs*), forty portages are made, in which the whole or part of the cargo is carried, there being besides some long rapids where it is not necessary to unload; and in descending to Lake Winipeg the portages are about fifty, their number and even the route varying with the height of water. Thousand Lakes (Journ. p. 62.) is an extremely irregular piece of water, having many extensive arms, some of which are very shallow. Multitudes of islands well covered with birch, aspen, arbor-vitæ (*Thuya occidentalis*), and the various pine trees of the region, render the scenery pleasing. A few granite knolls and mural precipices show among the trees; but many of the islets appear to be formed of sand, of which sections twenty feet high occur. The lake not only branches into the neighbourhood, but water communications diverge from it in every direction, as is customary in the "middle primitive belt."

From the Thousand Lakes the canoe route keeps on the border of the primitive rocks, touching on silurian deposits, when it bends to the southward or westward. At first it is flanked on both sides by granite. In Rainy Lake there is much mica-slate; and at its outlet the stream, falling over gneiss rocks, produces the cascade of *La Chaudière*. The greater fertility of the country about Nemican Lake and Rainy River show the vicinity of newer formations. In the Lake of the Woods Dr. Bigsby found the *Pentamerus Knightii*, a fossil characteristic of the upper silurian rocks; but granite is the chief constituent of the islands and shores of the lake. The River Winipeg flows wholly within the granite district, and has the lake-like dilatations and other characteristics of the streams which traverse the "intermediate primitive rocks." The wide extent of land

which its reuniting arms enclose is remarkable. One of its affluents, named English River, issues from Lake Sal, which lies near the water-shed, dividing the Winipeg basin from that of James's Bay. The Berens River which falls into Lake Winipeg, issuing from the common brim of the same basins further north, in the vicinity of the sources of the Severn River, affords a canoe route to Hudson's Bay. From my own observations in 1819, and Mr. Barnston's at a later period, it has been ascertained that limestones of the silurian epoch occur on the northern flank of the "intermediate primitive belt," as well as in the basin of Lake Winipeg. The Red River, which has been already repeatedly referred to, and which to prevent confusion with its southern namesake it would be well to call Osnaboyna, lies wholly to the westward of the "intermediate belt," and has a direct course from Lake Travers of 300 geographical miles. The sandy ridge named *Côteau des Prairies*, or *Hauteur des Terres*, separates its upper part from the Missouri valley; but the metamorphic rocks which present themselves around the sources of the Mississippi and its tributary the St. Peter, are also visible near Lake Travers. In the lower part of Red River limestone crops out in one place only, and is quarried by the settlers. Elsewhere the rocks are concealed by the sandy deposit forming the soil of the prairies, along whose eastern border the river flows. Major Long enumerates thirty affluents of the Red River, and its western branch, the Assinaboyn.

The Saskatchewan, which is to be considered as the main feeder of the Winipeg basin, flows from a considerable distance above Pine Island Lake down to Lake Winipeg over horizontal beds of limestone, through so flat a country that the river forks as it would in an alluvial delta. A rich mud is deposited in parts, particularly between Pine Island Lake and the main stream, and round Moose and Muddy Lakes. In Beaver Lake, which lies immediately to the north of Pine Island Lake, the silurian strata are again seen covering the flanks of the primitive rocks; while to the southward an eminence named Basquiau[66], lying at the distance of nearly a degree, separates the river valley from the Red Deer Lake and Swan River. As powerful salt springs exist on this eminence, we may conjecture that it belongs to the Onondago salt group.

I have been more particular in the topographical and geological remarks on the St. Lawrence and Saskatchewan basins, because economy of space made it expedient to omit the details of the voyage of

the Expedition through them. The remaining districts will be more briefly mentioned here, since the narrative included many facts relating to them.

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[64] Captain Lefroy's observations:—"In the Geological Appendix to Sir John Franklin's Second Journey, I estimated the height of Lake Winipeg above Hudson's Bay at 800 feet, which I considered to be a rough approximation. Major Long places it at the same level with Lake Superior, and the dividing ridge between the two basins at 600 feet higher; but, by the best estimates I have been able to form, he makes the summit of the ridge 230 feet too low."

[65] The height of this lake above Lake Superior was ascertained approximately as follows:—

	Feet.
Foot of Mountain Portage estimated by Captain Lefroy	48
Upper end of ditto (bar. meas. Rich.)	127
Ascent of river to Dog Portage (estimated, Rich.)	150
Upper end of Dog Portage above the lower (bar. meas. Rich.)	332
Ascent of Dog River to Thousand Lakes (estimate)	160
	817
Lake Superior above the sea	641
Thousand Lakes above the sea	1458

Owing to the obstructions in the upper part of the Dog River, the canoe route diverges from that stream at Cold-water Lake, and passes by the Prairie, Middle, and Savannah Portages, and a small

stream which flows from the latter into Thousand Lakes. The heights of this part of the route are as follows:—

	Feet.
Dog Lake, above Lake Superior	657
Ascent of Dog River	14
Portage to Cold-water Lake	2
West end of Prairie Portage and Middle Portage	161
	834
Lake Superior above the sea	641
Height of Prairie or of Middle Portage above the sea	1475

The difference of height between the ends of the Mountain Portage was carefully ascertained by me with Delcro's barometer in 1849. Major Delafield estimates the difference at 125 feet, and Lieutenants Scott and Denny, who accompanied Major Long in his voyage up the St. Peter's, at 130 feet. Mr. Murray, of the Canadian Geological Survey, measured the actual height of the falls here (named Kakkabikka) from the smooth water at their summit to the base, and found it to be 119 feet; but at least 8 feet must be added to give the difference between the ends of the portage, which terminates some way above the brow of the cascade. Captain Lefroy makes the height, by barometrical measurement, only 115 feet.

In 1849 the height of the upper end of Dog Portage was ascertained by me with Delcro's barometer; in the previous season the aneroid barometer gave 328 feet as the height, which was a greater degree of accordance between the

instruments than I generally found. Major Long estimates the water-shed between Lake Winipeg and Superior at 1,200 feet above the tide; Major Delafield calculates the height of Cold-water Lake at 505 feet, to which, if 161 be added for the Prairie Portage, and 641 for Lake Superior, we have 1,307 feet for the height of Prairie Portage above the sea. Captain Lefroy, by barometrical measurements made in connection with the observatory at Toronto, makes the west end of Prairie Portage 1,361 feet above the sea; but the distance between the two places of observation renders the result liable to some error.

[66] See Journal, I. p. 68.

VALLEY OF THE MISSINIPI.

The next river basin that we have to notice is that of the Churchill, English River, or Missinipi[67], the latter, or Cree appellation, being nearly synonymous with Mississippi. This basin, in crossing the intermediate primitive rocks, lies nearly parallel to the Nelson River or Katchewan, which is the lower part of the Saskatchewan. Deer and Wollaston Lakes, which discharge their waters into the Churchill River, lie in the line of lake basins mentioned above as running northwards from Lake Superior; but their axes do not cross the river valley so nearly at a right angle as Lake Winipeg does the valley with which it is connected. Further up the Missinipi the Methy, Buffalo, Clear, and Isle à la Crosse Lakes, which are situated just to the westward of the primitive rocks, taken in the aggregate, lie more in the plane of Lake Winipeg. On the eastern flank of the intermediate primitive ridge lie Big Indian and Waskayow-washgow Lakes, belonging also to the Missinipi river system.

The Missinipi, by its principal feeder, the Beaver River, has its source lower down the eastern slope than the Saskatchewan, and drains a comparatively small extent of prairie lands. At the Frog Portage and elsewhere the two basins are divided from each other by rocks only a few feet high, over which, in times of flood, the waters pour; so that the two may be viewed as one great valley through which two large rivers flow, their trunks running parallel to each other.

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[67] *Misi* or *mitchi*, in Cree, signifies "much or great," and *nipi* "water," while *sipi* means "river."

VALLEY OF THE MACKENZIE.

Further to the north lies the great valley of the Mackenzie, extending to the Arctic Sea, but having also its subordinate transverse lake basins, which differ from the southern ones in their heads merely entering the western border of the intermediate primitive rocks, and their discharging streams taking an opposite direction through the newer deposits.

Methy Portage forms the dividing brim between the Missinipi basin and the Mackenzie River valley, at the place where it is crossed in the usual canoe route; and, though the country be wooded, it may be considered as a partial extension of the prairie slope. The strata are bituminous shale[68] resting on silurian limestone, and covered with a thick arenaceous deposit. This is deeply furrowed by the channels of the Elk River, and its tributary the Washacummow; but the lake basins which mark out the border of the intermediate primitive rocks must be sought for further to the eastward. It is probable that this border touches a straight line drawn from Knee Lake, across the outlet of Athabasca Lake, to the deep northern arm of Great Slave Lake, and onwards by Marten Lake, across the two eastern arms of Great Bear Lake, to the Copper Mountains. That portion of the line which lies between Athabasca Lake and Methy Portage is little known, because the water route lies to the westward of it. Wollaston and Deer Lakes already mentioned, will, if this line be correctly drawn, be situated considerably within the border of the primitive rocks; and an illustration of the manner in which the waters occupying the minor valleys of that district communicate with each other is afforded by Wollaston Lake sending a stream from its north end into Athabasca Lake, and one from its south end into the different river system of the Missinipi. This fact, which, as reported on the authority of the fur-traders, is expressed in Arrowsmith's map, may be considered as proving that Wollaston Lake is considerably elevated. Indeed, it seems to be high up on the water-shed which separates the Mackenzie valley from the basin of Hudson's Bay.

According to Captain Lefroy's measurements and estimates, Methy Lake is about 1,540 feet above the sea; and I ascertained the summit of Methy Portage road to be 188 feet higher than the lake; while the Washacummow, or Clear-water River, on the north side of the portage, is 590 feet below it, and by my calculations 910 feet above the sea.

From Methy Portage westwards, the country, though deeply furrowed by river courses and ravines, and more or less thickly wooded, partakes so much of a prairie character that horsemen may travel over it to Lesser Slave Lake and the Saskatchewan. At the junction of the Washacummow with the Elk, the channel of the river is sunk 925 feet below the summit of the portage, which may be assumed as near the mean level of the district, and is 1,688 feet above the sea.[69]

The Athabasca, Red Deer (*La Biche*) or Elk River, the most southerly feeder of the Mackenzie, originates in the Rocky Mountains near Mount Browne, which is said to rise 15,000 feet above the sea, and, flowing through prairie lands, receives the waters of Lesser Slave Lake, whose axis crosses its general course, and afterwards those of Red Deer Lake. Its bed is in many places deeply cut beneath the level of the prairie plateau, which is not separated by any marked ridge from the Saskatchewan prairie country. Further north, the wide-spreading sources of the Peace River drain the Rocky Mountain chain for four degrees of latitude, and the trunk formed by their union curves across the slope to join the Athabasca a little below the transverse basin of the Lake of the Hills. The channel of the Peace River is cut into silurian or Devonian strata; but the Lake of the Hills, or Athabasca Lake, runs eastward among the "intermediate primitive rocks," and, as has been said above, receives a tributary stream from Wollaston Lake, situated near the watershed which divides the basin from Hudson's Bay. The conjoined stream of the Peace and Athabasca Rivers assumes the name of Slave River, which flows in the fracture between the silurian and primitive rocks. The junction of the western arm of the river with Great Slave Lake marks the western border of the primitive rocks, which is also indicated on the northern side of the basin by the Fort Providence Inlet. Aylmer and Artillery Lakes lie 150 feet higher at the east end of the lake, into which they send their waters; and in their immediate vicinity, on the same plateau, are the sources of the Great Fish or Back's river, which falls into the Arctic Sea, as has been already stated. The streams that run from the westward into Chesterfield Inlet must come from near the same place; and this inlet, from its transverse direction, and east-north-east bearing from Great Slave Lake, has an evident connection with that excavation, their axes being nearly at right angles to the Rocky Mountain chain.

In Great Slave Lake the Mackenzie is deflected from the intermediate primitive belt, and flows first westwards then northwards, in a channel scooped out of the upper silurian strata and still newer deposits, for 1,000 statute miles of river course, or nearly 600 geographical miles in a direct line; neither granite, gneiss, nor mica slate are seen on its banks, and even trap rocks are rare, if any actually occur.

The River of the Mountains, embracing by its feeders a more northern part of the Rocky Mountain chain, after disengaging itself from the rugged hills from which it draws its supplies, makes a northerly bend nearly parallel to Slave River, and then joins the Mackenzie at Fort Simpson. Of this mountain stream I have already given a slight notice in the Narrative (Vol. I. pp. 167—170.); and I may add here that for twenty-five miles upwards from its mouth it flows through sand and shale, with limestone occasionally cropping out. At the end of that distance there is a rapid, above which low wooded points exist, with at intervals mountain bluffs coming down to the banks of the river. The most remarkable of these stands at the influx of the Noh'hannè River, and is named the *Noh'hannè bute*. It is the highest hill in that quarter, and is about seventy-five miles from Fort Simpson. Perhaps it is a member of a range whose prolongation is seen indistinctly in descending the Mackenzie about half-way between Hare Skin River and Fort Simpson. Messieurs M'Pherson and Bell ascended it, and the latter gentleman was seized with nausea and vertigo before reaching its summit; so that its altitude is probably considerable, but the snow disappears from it in summer. *On its top* there is a salt spring, having a basin fifteen feet in diameter, which is never dry. For this notice I am indebted to Mr. M'Pherson, who brought from it some fragments of limestone that were similar in lithological character to those procured at the rock by the river's side, described in page 182 of the first volume of the Narrative.

Great Bear Lake, the most northerly of the transverse freshwater lakes, lies about 150 feet above the channel of the Mackenzie, and crosses the arctic circle on the line where the hypogenous and silurian rocks meet. Coronation Gulf is also excavated on the same line, which has a general parallelism to the Great Slave Lake series of excavations enumerated above.

The northerly trending of the coast line west of the Mackenzie is evidently due to the prolongation of the Rocky Mountains, whose

successive ridges or spurs come out *en échelon*, diminishing in altitude as they approach the shore.

The short western slope of the continent from the Rocky Mountains to the Pacific differs from the eastern one in its configuration, its river valleys being all more or less transverse. The peculiar wing-like projection in the north, towards Asia, is evidently due to the volcanic chain of Alaska, which runs at right angles to the Rocky Mountains. The great transverse river valley of the Yukon or Kwichpack lies to the north of it. The western sea-coast from Cook's Inlet to Behring's Straits is delineated in a map attached to Baer's "Nachrichten über den Nordwestküste von Amerika," published in 1839, though it seems to have been hitherto neglected by our topographers; and the interior of Russian America has remained a blank in our maps.[70]

For the following information respecting the Hudson's Bay Company's land to the west of the Mackenzie, and for some account of Russian America gathered from the natives, I am indebted to Chief Factor M'Pherson, Chief Trader Bell, and to the letters of Mr. Alex. H. Murray, alluded to in a preceding page. By ascending the River of the Mountains, and tracing its north-west branch to Lake Frances, a very elevated mountainous country is reached. In this the Lewis, which flows towards the Pacific, takes its rise, its sources springing to the eastward of those of the River of the Mountains; so that here, as well as in other parts of the Rocky Mountain chain, the rivers falling into opposite seas interlock at their origin. In lat. 61° 30′ N., long. 130° W., the Lewis is joined by the River Francis, which has no connection with the lake of a similar name, but comes from Russian Lake, a sheet of water lying more to the south. At the junction of the Francis and Lewis, Mr. Roderick Campbell has built a trading post, named "Pelly Banks," which, according to his experiments with the boiling water thermometer, is elevated 1,400 feet above the ocean. The united streams take the name of the Pelly, which falls into the Pacific, probably into Tchilikat or Lynn Canal, but the exact situation of its mouth has not been ascertained. Native traders come from the head of Tchilikat to Pelly Banks in a fortnight.

From the same elevated district in which the Lewis or Pelly and the north-west branch of the River of the Mountains take their source, the Yukon, a river of great magnitude, issues; and for a considerable part of

its course flows to the north, through a country which, as far as I can judge from the descriptive notices of it which I have collected, closely resembles the valley of the Mackenzie. Mr. Murray was disposed at one time to identify this river with the Colville, which falls into the Arctic Sea about 120 miles to the east of Point Barrow; but more recent and full native information leads him now to conclude that it flows towards Norton Sound; and one of the officers of the Enterprise, in a private letter which has been published, states that the Russians have established its identity with the Kwichpack, which falls into Beering's Sea between Cape Stephens and Cape Romanzoff.[71]

In 1847, Mr. Bell, having heard of the Yukon from the Kutchin who visited the fort on Peel's River, set out in quest of it accompanied by a native guide. He first crossed the mountains to a stream termed the Rat River, on which an outpost named La Pierre's House has since been built. This post is about sixty miles distant from Bell's Fort on the Peel, and is about ten miles to the southward of it. Shortly after embarking in a canoe on the Rat River, Mr. Bell came to one of much larger size to which it is tributary, and which is named the Porcupine. Three days' descent[72] of this carried him into the Yukon, which it enters at right angles in the 66th parallel, and in the supposed longitude of 147¼° west.[73] At this place the Yukon is 1¼ mile wide, and is full of well-wooded islands, with a very strong current in the channels which separate them. After issuing from the mountainous district north of Pelly Banks, the course of the Yukon is, according to the Indians, to the westward of north; and in one place where it cuts a spur of the Big Beaver Mountains, it passes between high limestone cliffs resembling the "ramparts" on the Mackenzie. Its current is every where more rapid than that of the river just named. The first important tributary which it receives is the Red Island River, that flows in from the mountains on its eastern bank, and is divided at its source from the head of the Peel by a single ridge of land. Between it and the Lewis there is a barren plateau, which the Indians cross in four days, but on which they find no water.[74] Another tributary from the east comes in lower down, and below that Deep River enters from the west. The Russians appeared on this stream with a skin boat (baidar), coming overland, it was supposed, from the Copper River or Atna, which joins the Pacific in Comptroller's Bay. From below the

"ramparts," which are reckoned to be about seventy miles above the influx of the Porcupine, the Yukon flows to the north-west through a flat country; but twenty or thirty miles below the mouth of that tributary it again cuts a spur of the Beaver Mountains, trending at the same time to the south-westward and westward, and finally issuing in Beering's Sea, under the Eskimo appellation of Kwichpack, as has been mentioned above. Below the Big Beaver Mountains it receives from the south the "River of the Mountain Men," which runs parallel to the main stream for some distance before entering it. From thence to the sea the Kwichpack flows, according to the natives, through a low, marshy, and very sparingly-wooded country.

Mr. Murray, in his letter to me quoted above, mentions his intention of exploring the Yukon as far as he had leisure to do so in the summer of 1850; and it was probably the report of his party having been seen which induced Captain Collinson to land Lieutenant Barnard and Mr. Adams at Fort Michaelowsky, that they might ascertain who the white men were.

On the Pacific coast only of North America does volcanic action exist at the present time. Many peaks throwing out fire and smoke are mentioned by Bäer. They lie in a line running west-south-west from the north side of Kanai or Cook's Inlet, through the peninsula of Alaska and the Aleutian Islands. Many of their summits rise into the region of perpetual snow. Among these Ilämän has a height of 13,151 feet, and Winkelhöhe of 11,270, both lying on the north bank of Cook's Inlet. In Alaska there is the Peak of St. Paul, and in the islands Schischaldin which is 8,953 feet high, besides Schimaldin, Makuschkin, Korowenskische, and many others. The line in which these volcanic peaks lie when prolonged to the eastward, strikes the Big Beaver Mountains on the Yukon.

Mounts Edgecumbe, Fairweather, and St. Elias are, I believe, extinct volcanoes, which form, with those of Alaska, nearly the segment of a circle.

On the side of the Atlantic modern volcanic rocks occur in Jan Mayen's Island only, whose principal mountain, Beerenberg, rises 6,870 feet above the sea. In the coal of Jameson's Land, lying in north latitude 71° on the east side of Greenland, and in that of Melville Island, in latitude 75° north, Professor Jameson found plants resembling fossils of the coal fields of Britain. This fact is sufficient of itself to raise a world of

conjecture respecting the condition of the earth when these ancient fossils were living plants. If the great coal measures, containing similar fossil vegetable forms, were deposited at the same epoch in distant localities, there must have existed, when that deposition took place, a similarity of condition of the North American continent from latitude 75° down to 40°.[75]

In concluding this sketch I shall advert to the distribution of the fossil remains of mammalia, and especially to those of the mammoth. Teeth of this animal have been discovered on the banks of several rivers in Russian America, north of Mount St. Elias; and there is a celebrated locality in Kotzebue Sound where the thawing and waste of frozen cliffs is continually exposing the bones and tusks of mammoths and other quadrupeds. Dr. Buckland, in his interesting account of the specimens collected at this place, on Captain Beechey's voyage, enumerates fragments of bones of mammoths, and of the urus, the leg-bone of a large deer, and a cervical vertebra of some unknown animal, different from any that now inhabit Arctic America. Along with these there were found also the skull of a musk ox and some bones of the reindeer in a more recent condition than the others. In Asia, from the Don to Beering's Straits, on the banks of all the great rivers, bones and teeth are still more plentiful, the local deposits being richer and more extensive the more we advance to the north. They are especially abundant on the islands north of Sviatoi Noss (Sacred Cape), lying between the 73d and 76th parallels; and some of these islands seem to consist in a great part of organic remains, which fill more space than the matrix in which they lie. The soil containing them is frozen as hard as a rock; and, as it thaws annually, the bones drop out or are quarried by the natives. From time immemorial this has been proceeding, and the ivory hunters have been obtaining their annual supply without any sensible diminution of the store they draw from. Some tusks found in New Siberia weigh 480 lbs., and from that island alone the merchants of Yakutzk, in 1821, obtained 20,000 lbs. weight of this fossil ivory. Though the tusks of the mammoth (*Elephas primigenius*) are chiefly sought for, bones and teeth of other animals are found, and among the rest those of the *Rhinoceros tichorinus*, of which the skulls, flesh, and skin, with its hair, have been procured. The remarkable discovery in 1799, by a Tungusian, at the mouth of the Lena, of the entire carcase of a mammoth, in excellent preservation, is well known. The existence of

these numerous testimonials of an ancient fauna is suggestive of many curious speculations, and geologists seem hitherto to have failed in explaining the circumstances under which accumulations so vast could occur in such high latitudes. The difficulty is increased when we consider that these bones have not been detected to the east of the Rocky Mountains in the northern latitudes. None have hitherto been found in Rupert's Land, though the annual waste of the banks of the large rivers and the frequent land slips would have revealed them to the natives or fur traders had they existed even in small numbers. They are rare also, or altogether wanting, in Canada, but in the valley of the Mississippi the bone-licks are well known as most extensive and furnishing the remains of a different series of extinct quadrupeds.

The existence of the skull of a musk ox in Kotzebue Sound is of much interest. This relic is preserved in the British Museum, and the naturalists who have compared it with recent skulls of the animal brought from Melville Island or Churchill, perceive no difference. But, as the species is not known to frequent any district to the westward of the Mackenzie, the transport of any of its bones in modern times to Kotzebue Sound cannot be readily accounted for.

In a preceding page I have alluded, in a general way, to the distribution of boulders on the eastern prairie slope and in the valley of the Mississippi. The journal of the voyage shows that these are everywhere present in the north. The surface soil, the beds of rivers, and sea-shore abound in them. I noticed them also in various places accumulated in clusters, forming small eminences of from 10 to 100 yards in diameter, and from 8 to 20 feet high. These may be ice-borne boulders. The usually circular form of the heaps militates against their being glacier moraines. Such collections are of frequent occurrence on the borders of Great Bear Lake, and in the valleys that separate the spurs of the Rocky Mountains,—several hundred feet above the present levels of the lakes and rivers. They also occur in more southern localities.

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[68] It is doubtful whether this shale be referable to the Marcellus shale or not.

[69] See Narrative, Vol. I. p. 114. Captain Lefroy's

estimate of the height of Methy Lake exceeds mine by 40 feet.

[70] The newest work on this district of America is, "Beitrage zur Kenntniss der orographischen und geognostischen Beschaffenheit der Nordwestküste Amerikas," von Dr. C. Grewingk, St. Petersburg, 1850; but this I have not been able to procure.

[71] The following is an extract of a letter to me from Mr. Murray, dated May 1850, on the Yukon:—"My account of the course of this river, also a sort of chart I made of it from the description given by the Indians, might, perhaps, lead you to have a wrong impression respecting the mouth of the river. I am now convinced that it is not the same with the Colville, and I have for some years suspected that its mouth lay to the west. The Russians have come up the lower part of the river regularly for some seasons: I was at first informed that they entered it from another river, but I am now told positively by Indians who went down and met them last summer that they come into it direct from the sea. By one of these Indians I received a letter from the Russians, which, being in their own language, is unintelligible to me. Salmon and hooked-nosed trout (*Salmo scouleri*) ascend the river, but are not found in the Mackenzie, or rivers falling into the Arctic Sea. Again, I have made frequent inquiries of the 'Gens du large,' or the northern Indians, who visit the Arctic Sea-coast, and find that they are unacquainted with the mouth of the river. For two winter days' walking below the Porcupine, the Yukon trends to the west and south-west, and the natives say that it flows on in the same direction. I am therefore inclined to believe that the Colville is a smaller river, and that the Yukon empties its waters into Norton Sound."

[72] In returning from the Yukon against the stream, by

tracking the canoe, nine days were required to reach Rat River.

[73] By Mr. Murray's courses and distances.

[74] There is a district in Siberia on which neither snow nor rain is said to fall. This may be a similar one; for it can scarcely be, in so rigorous a climate, that melting snow, if it exists, should not leave pools of water all the summer.

[75] The coal of Vancouver's Island and Oregon belongs, it is said, to the great coal measures.

No. II.
CLIMATOLOGY.

Snow Line.—Ground Ice.—Thermometrical Observations in the Valley of the St. Lawrence.—Comparative Temperature of the Two Sides of the Continent.—Phenomena of the Seasons at Penetanguishene: At Fort William: At Fort Vancouver.—Thermometrical Observations in the Valley of the Saskatchewan.—On the East and West Sides of the Continent in that Parallel.—Phenomena of the Seasons at Cumberland House: At Carlton House: At Marten's Falls on Albany River.—Thermometrical Observations on the Missinipi and in the same Parallels on the East and West Sides of the Continent.—Thermometrical Observations in the Valleys of the Mackenzie, Yukon, and Pelly.—Progress of the Seasons at Fort Franklin.—Thermometrical Observations on the Arctic Seas.—General Remarks.—Nocturnal Radiation.

The remarks which follow on the climate of North America have reference especially to the districts through which the Expedition travelled, some general facts being, however, illustrated by observations made in other quarters.

The course of the snow line has always engaged the attention of travellers, who have ascended high mountain ranges, or penetrated into Polar regions. Nowhere on the route of the Expedition is the snow permanent; not even on the summits of that part of the Rocky Mountains which skirts the Mackenzie. Snow may indeed be occasionally found in summer which has drifted into some narrow ravine, or under a high cliff with a northern exposure; but these patches are of small extent, and have no general influence on the temperature of the district in which they occur.

In lat. 65° N., the snow remains continually on the ground from the middle of October till the beginning of May, at which time the soil begins to appear after it has been covered up for 200 days. The thickness of the snowy covering materially affects the depth to which the low winter

temperature can be traced into the subsoil. In places of small extent, sheltered from cold winds, and having a good drainage, with a southern aspect, the vernal rays of the sun assist in removing the snow early; while a retentive clay, even in lower and more southern localities, produces a tardy summer and late frosts. Such are the hypogenous or primitive districts, which from their cold climate and ungenial soil have been justly named "barren grounds," and are analogous to the *terra damnata* of Lapland, described by Linnæus; or the *tundras* of Arctic Siberia; in such tracts the snow falls early and remains long. The active vegetation of forest lands reacts on the soil; excited by the sun's rays, the trees are roused from their winter's sleep, while the soil is still as hard as a rock, and the snow disappears sooner from over their roots than elsewhere. At the Equator the permanent snow line is said to vary from 15,000 feet of altitude to 20,000, to sink to 3,800 on the 60th parallel of latitude, and to be one foot high on the 75th parallel.[76] The latter assumption does not, however, accord with observations in the northern hemisphere. In no arctic district to which man has yet penetrated, is there a permanent covering of snow through any wide extent of low country. Even at Spitzbergen, only nine degrees from the Pole, there is a summer in which vegetation proceeds, of which we have witnesses in the flora and fauna. The well-fed herds of reindeer, which that hyperborean land maintains, must find grass and lichens, whereon they fatten.[77]

On the north side of Lake Superior, the duration of the winter's snow is less by at least sixty days than it is in lat. 65° N., that being the difference due to about twenty-seven degrees of latitude. In favourable seasons, at Melville Island, in lat. 74¾° N. and long. 110° W., the snow towards the end of June lies only in the valleys where it had drifted deeply, and the level meadows remain uncovered for seventy days, or till the beginning of September. In Regent's Inlet, which is more to the eastward, the snow dissolves less rapidly; and at Igloolik, still further east, notwithstanding a difference of 5½° of southing, the soil is uncovered for a still shorter period, furnishing an illustration of the depression of temperature on the eastern coasts, on which some observations will be made in a subsequent page. The subjoined tables will furnish the dates of the disappearance of the snow in the spring, of various more southern localities.

The opinion held at no distant date by eminent meteorologists, that a

mean annual temperature of the freezing point of water coincides with the snow line, has been satisfactorily disproved by observation. Everywhere to the eastward of the Rocky Mountains, the isothermal of 32° F. is below the fifty-seventh parallel of latitude.

When the rigour of the climate of Arctic America is considered, the under limit of permanent snow on the hills appears to be very elevated. The true laws of the altitude of this line have not yet been ascertained. Correct measurements have shown that within the tropics the snow line varies several thousand feet, even in the same range of mountains, according to its different aspects. The active radiation of the sun in the continuous day of an arctic summer, in conjunction with the comparatively small winter deposit, must tend to elevate the snow line; while within the tropics, the effect of a vertical sun is compensated by nocturnal terrestrial radiation, and the deposition that attends the sudden cooling of an atmosphere charged with moisture. The same or similar causes must tend to vary the breadth of the mountain zone, comprehended between the summer and winter snow line. The east coast climate everywhere north of Canada has an analogy to this zone, and not to its upper limit or the permanent snow line.

Another phenomenon intimately connected with the mean temperature of a district, is the "ground ice" or "permanently frozen subsoil." The lateral extent of this substratum, its southern limits, and its thickness, are interesting subjects of inquiry. It is well known that the warmth excited by the sun's rays is conducted slowly and progressively into the earth, the effects of seasons and years following like tides, but becoming less sensible and less distinct until they are blended, and at a certain depth vanish altogether. Professor Forbes says, that "the decrease of the annual range is common to the strata of the air above the surface of the earth and to those of the soil beneath; both ultimately, no doubt, exhibit a limit, first where the diurnal variations disappear, then the annual." The cause, however, he states is different in the two cases; the one being chiefly the result of the radiation, and the other of the conduction of heat. The limit here spoken of, or the depth to which the periodical changes of summer and winter are felt, is influenced by a variety of circumstances, and differs in different localities. The temperature of that limit would be, it is supposed, that of the mean of a number of years (fourteen or fifteen perhaps) forming a complete cycle of

the annual variations.

The limit or commencement of permanently frozen soil, or ground ice, is coincident, according to Bäer, with the isothermal line of 32° F.; and its thickness increases in proportion as the mean temperature of the locality falls below that degree, its unlimited descent being checked by the interior heat of the earth.

Observations of the temperatures of mines and of artesian wells have established the fact that the temperature rises as we penetrate into the crust of the earth; but the rate of increment has not yet been satisfactorily determined. The temperatures of mines in the same district, and of different parts of the same mine at equal depths, vary greatly. Some authors fix the increment at one degree of Fahrenheit for every forty-five feet of descent, after the superficial stratum which is directly influenced by the solar heat has been passed.

At Yakutzk, in Siberia, on the sixty-second parallel, with a mean annual temperature of 14° F., a well dug to the depth of 382 feet just penetrated the frozen earth, and the resulting increment of heat there is one degree for twenty-eight feet of descent. At Fort Simpson, on the Mackenzie, very nearly in the parallel of Yakutzk, but having a mean annual temperature of 25° F., the frozen substratum was found to terminate at the depth of seventeen feet from the surface, the underlying bed being loose and sandy. The surface soil there was thawed at the close of summer (19th October, 1837), to the depth of nearly eleven feet, so that the ground ice was only six feet thick.

At York Factory, on Hudson's Bay, in lat. 57°, in October, 1835, recent frosts had penetrated eight inches into the soil; the thaw due to the summer heat extended twenty-eight inches beyond this, beneath which a frozen bed seventeen and a half feet thick reposed on thawed mud which had a temperature of 33° F. The mean annual heat of this place is 25½° F., being equal to that of Fort Simpson, which lies five degrees further north.

At Severn outpost, exactly one degree of latitude to the South of York Factory, and on the same coast of Hudson's Bay, the surface had thawed at the close of the summer of 1835 nearly to the depth of six feet, and the frozen substratum was dug into seven and a quarter feet, being thirteen feet in all, but not passed through, so that its thickness was not ascertained.

I have no information respecting the ground ice of the Peace River or Saskatchewan prairie districts.

At Rupert's House, on James's Bay, near the level of the sea, in lat. 51° 26′ N., long. 78° 40′ W., the soil in an exposed situation in the month of April was frozen to the depth of seven feet; but under a snow-drift the frost had penetrated only thirteen inches into the earth. At East Main, situated on the opposite side of the same bay, in lat. 52° 15′ N., long. 78° 40′ W., the ground under a snow-drift eight feet thick was frozen to the depth of only ten inches. The pits at these places were not dug deep enough to give any information respecting the existence of a permanently frozen substratum.

On Michiskum Lake, which lies in lat. 49° N., long. 78° W., on the north side of the watershed that divides the Abitibbe, or eastern branch of Moose River, from Lake Temiscaming and the Ottawa, and which is about 700 feet above the sea, the frost towards the close of winter had penetrated three and a half feet in a cultivated field, while in the woods not above six inches of soil were frozen. No search was made for a frozen substratum. These are the chief observations[78] I have been able to collect, having reference to this subject. It is plain that much more extensive researches are required to enable us to form any general conclusions which can be relied on.

Professor Bäer informs us that in Europe and Siberia, the farther we go east, the more southerly do we find the limit of perpetual ground ice to be. In the environs of Lake Baikal, ice remains at least in one locality all the year. No permanent ice was found at Tobolsk in lat. 58° N., but Humboldt discovered small pieces at the depth of six feet in summer in the elevated district of Boguslowsk, near the foot of the Ural Mountains, in lat. 59° 45′ N. It would appear from these instances that the ground ice has a more southerly limit on the shores of Hudson's Bay than in Siberia; and that in America, as far as observations go, that limit follows the course of the isothermal lines which dip to the south as they proceed to the eastward.

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[76] Von Buch states the height of the snow line at the North Cape (Europe) at 2,275 Prussian feet. —*Meyen, Geog. of Plants.*

[77] The Herald Island, discovered by Captain Kellett in lat. 71° 19′ N., long. 175° 23′ W., to the north of Beering's Straits, is 1200 feet high, and consists of granite precipices to the height of 900 feet, and then a succession of terraces, on which there grows a turfy vegetation. Eight species of plants were gathered from these terraces, viz. a *Hepatica*, *Poa arctica* and another grass, *Artemisia borealis*, *Cochlearia fenestrata*, *Saxifraga laurentiniana*, a moss and a red lichen, which covered the rocks.

[78] All the experiments made in Rupert's Land, in 1835-36, are detailed in the Ed. New Philos. Journ. for January 1841.

THERMOMETRICAL OBSERVATIONS IN THE VALLEY OF THE ST. LAWRENCE.

The subsequent tables of temperature and notices of the progress of the seasons are arranged so as to convey, as far as my materials go, a view of the climates of the successive lake basins from the St. Lawrence northwards. *Table II.* is intended also to illustrate the fact that the climate, on the west side of the continent, is milder than in the eastern states. Fort Vancouver being upwards of forty miles from the coast in a direct line, its climate cannot be called maritime, and its temperatures may be conveniently contrasted with those of Montreal, which is also situated on the banks of a first-rate river, and not under the influence of sea-breezes.

There is very little difference in the latitudes of the two places, or in their altitudes above the sea; but the direct distance between them exceeds 2,200 geographical miles. The difference of their mean annual temperatures is, at least, eight degrees of Fahrenheit in favour of the Pacific coast, and is equal to what would be produced by a diminution of four or five degrees of latitude on the same meridian. The greater mean heat of the Pacific side of the continent has been long known, and a reference to the table will show that it is mainly due to the milder winters; the mean difference between the summer and winter temperatures being twice as great at Montreal as on the Oregon. On the other hand, the summers are sensibly warmer at Montreal. The notices of the progress of

the seasons on the two sides of the continent will illustrate these facts equally well. The early spring at Vancouver, with the two inches of snow and a rainy winter, contrasts strongly with the long dry winter and three feet of snow at Penetanguishene, where the ice does not disappear from the lake till past the middle of April.

Columns 1. and 2. of the same table refer to places immediately on the coast, and Franklin Malone is at an altitude above Fort Vancouver, which is considered to be equivalent to two degrees of mean annual temperature. If we compare these columns with column 4., we perceive that with little change of mean annual temperature, places on the coast have a more equable climate, the three winter months being comparatively milder, and the three summer ones less warm.

Table I. shows that as we advance into the interior, the heat of the summer is kept up, or even augments, notwithstanding the elevation above the sea attained by ascending the successive stages of the St. Lawrence basin.

The nature of the rock formations has a considerable influence on the climate of a district. In the primitive country, such as has been described in a preceding page as abounding in lakes and swamps, the climate is extreme, the winters being not only longer, but also more severe, the dissolution of the ice in such districts absorbing much heat. A marked difference occurs when we pass from the "intermediate primitive range" to the prairie districts lying to the westward; for, notwithstanding the greater elevation of the latter, the winters are milder, the snow less deep and less durable, the rivers break up earlier, and the sap flows sooner in the trees. A corresponding difference in the vegetation occurs; the prairie plants have much less of an arctic aspect than those of the primitive districts. Professor Agassiz, in his work on Lake Superior, has instituted a very interesting comparison between the vegetation of that basin and the lower and middle subalpine zones of the higher tracts of the Jura, proving their very great similarity. With the prairie districts, the analogy of the Jura is very much less strong. Many of the plants which give the peculiar character to the prairies south of the Missouri, range northwards to the branches of the Peace River, a main affluent of the Mackenzie; and several prairie plants enter the silurian wooded tracts which lie to the westward of the "intermediate primitive range," though they have not been discovered in the more eastern parts of the continent.

TABLE I.

Temperature of various Places in Lakes Ontario, Erie, Huron, and Michigan.

Key:

(1.) *Lake Ontario*, North Side Toronto.
Latitude 43° 40′ N., Longitude 79° 22′ W., Altitude 340 Feet.
Hourly Observation for 5 years at Magn. Observatory.

(2.) *Lake Huron*, East Side Penetanguishene.
Latitude 44° 48′ N., Longitude 80° 40′ W., Altitude 626 Feet.
At 8 and 8, by C. Todd, Surgeon R.N., corrected by Dove's Form.

(3.) *Lake Michigan*, Green Bay, Fort Howard.
Latitude 44° 40′ N., Longitude 87° 00′ W., Altitude 600 Feet.
At 7, 2, 9, corrected by Dove's Form.

(4.) *Lake Erie*, East End Buffalo.
Latitude 42° 55′ N., Longitude 78° 55′ W., Altitude 575 Feet.
Computed by the Form. N.Y. Dove. 2 Years Observation.

(5.) *Lake Erie* and R. S. Clair, Detroit.
Latitude 42° 19′ N., Longitude 82° 58′ W., Altitude 575 Feet.
At 8 and 2, 3½ Years, corrected by Dove's Form.

Periods.	(1.)	(2.)	(3.)	(4.)	(5.)
January	25.34	23.42	17.76	23.41	20.26
February	23.71	22.60	20.05	21.14	31.32
March	30.37	31.90	30.87	35.49	39.88
April	43.38	37.82	42.83	40.70	49.68
May	53.28	55.36	56.57	55.29	57.07
June	60.88	67.99	67.86	67.45	68.02
July	66.28	73.31	71.71	71.55	70.83
August	66.73	69.40	68.67	69.99	68.87
September	58.71	56.03	56.91	59.89	61.68
October	45.69	50.11	46.74	48.75	54.28
November	36.03	38.86	33.97	37.22	38.05

December	27.24	25.24	20.95	27.80	29.32
Year	44.81	45.74	44.57	45.54	49.10
Winter	25.43	23.75	19.59	24.12	26.97
Spring	42.34	35.02	43.43	43.83	48.87
Summer	64.43	70.24	69.41	69.66	69.24
Autumn	46.81	48.34	45.87	48.62	51.34
Difference of hottest and coldest months	48.81	49.99	53.95	50.41	50.57
Difference of summer and winter	39.20	46.49	49.82	45.54	42.27

No. 1. is taken from the volume of observations made at the observatory at Toronto, published by Government. No. 2. from Franklin's Second Journey. Nos. 3., 4., and 5. from Dove's tables in the Report of the British Association for 1847.

TABLE II.

Comparative Table of Temperatures on the East and West Sides of the Continent near the 45th Parallel.

Key:

East Side. *Atlantic Coast.*

(1.) Maine, Eastport.
Latitude 44° 54′ N., Longitude 66° 56′ W., Altitude 15 Feet.

(2.) Nova Scotia, Halifax.
Latitude 44° 39′ N., Latitude 63° 38′ W., Altitude 15? Feet.

East Side. *St. Lawrence Valley.*

(3.) North N. York, Fr. Malone.
Latitude 44° 50′ N., Latitude 74° 23′ W., Altitude 645 Feet.

(4.) Canada, East, Montreal.
Latitude 45° 31′ N., Latitude 73° 35′ W., Altitude 60 Feet.

West Side. *Oregon State.*

Fort Vancouver on the Columbia, 50 miles from the Sea. Latitude 45° 37′ N., Longitude 122° 45′ W.

(5.) Hours 7, 2, 9.

(6.) Hours 8 and 8.

(7.) Hours 7-1.

(8.) Hour 2 p. m.

	East Side.				West Side.			
	Atlantic Coast.		*St. Lawrence Valley.*		*Oregon State.*			
Periods.	(1.)[79]	(2.)	(3.)	(4.)	(5.)	(6.)	(7.)	(8.)
January	19.18	20.00	28.24	13.03	37.62	36.58	37.10	40.68
February	22.71	18.00	26.15	17.68	42.89	35.37	38.98	44.07
March	29.85	25.00	31.42	30.89	43.68	44.05	47.47	55.06

April	38.72	30.00	45.08	46.80	45.55	50.22	- -	62.50
May	48.99	40.00	52.67	53.97	53.44	58.43	- -	74.61
June	56.31	50.00	60.22	59.73	62.48	58.72	- -	73.17
July	63.28	63.00	66.90	68.90	65.46	61.76	- -	75.71
August	63.24	70.00	65.45	68.04	65.84	63.05	- -	79.74
September	57.15	51.00	55.17	57.61	60.30	61.10	- -	74.27
October	46.33	51.00	46.92	46.50	53.23	52.62	48.27	68.16
November	36.18	38.00	32.85	31.58	42.68	38.83	39.23	48.27
December	24.55	25.00	21.22	19.66	42.95	34.49	38.60	42.06
Year	42.41	40.08	43.52	42.12	51.34	49.73	- -	61.91
3 Winter months	22.15	21.00	21.87	16.95	41.15	35.49	38.23	42.21
3 Spring months	39.19	31.67	43.06	39.03	47.55	50.90	- -	64.07
3 Summer months	60.94	61.00	64.19	67.26	64.67	61.30	- -	76.14
3 Autumn months	46.55	46.67	44.98	45.18	52.00	50.92	- -	64.71
Difference of hottest and coldest months	44.10	52.00	48.66	55.87	28.28	28.56	- -	39.06
Difference of summer and winter	38.79	40.00	42.32	50.31	23.52	25.81	- -	33.93

[79] Columns 1., 2., and 3. are extracted from Dove's paper, published the Report of the British Association for 1847, being corrected for t diurnal variation computed for Toronto by Dove, in the same pap No. 4. is abstracted from a paper by J. S. M'Cord, Esquire, print at Montreal, and discussing observations of temperature for 1839 a 1840, and 1840-41, 12 times daily at the even hours.

Column 5. is also from Dove's paper, and is reduced by l formula.

Columns 6. and 8. are abstracted from a year's observations, G. B. Roberts, Esquire, of the Hudson's Bay Company, with thermometer of Newman's construction. Column 6. is reduced for t

hours of observation, according to Dove's formula for Toront
Column 8. is transcribed without correction. Column 7. is an abstra
of observations by the Rev. S. Parker, also corrected by Dove
formula.

The subjoined is an abstract of observations for seven yea
made by Henry Poole, Esquire, at Albion Mines, near Pictou,
Nova Scotia, and on the coast of the Gulph of St. Lawrence. M
Poole ascertained the minima in the night by a self-registeri
thermometer, and the maxima between 1 and 2 P. M., by
thermometer hung on the north side of the house, and sheltered fro
the north winds by a plantation of firs at the distance of a few yard
The observations are corrected for the Toronto diurnal variation f
an hour before sunrise, and 2 P. M. As there appears to have be
some local cause, producing higher winter temperatures than in oth
parts of the coast, I did not think it expedient to introduce the
observations into the comparative table.

Abstract of Temperatures at Albion Mines, 120 Feet above the Sea
Lat. 45° 34½′ N., Long. 62° 42′ W. Means of Maxima.

Jan. 50.58 F.	March 52.53	June 68.86	Sept. 62.42	Year 56.(
Feb. 51.85	April 54.51	July 70.64	Oct. 55.10	
				Diff. hot
Dec. 51.11	May 58.61	August 70.61	Nov. 49.98	and 20.(cold mths.
				Diff. of
Wint. 51.18	Spring 53.23	Summer 69.04	Autumn 55.83	sum. 17.8 and wint.

TABLE III.

TABLE OF TEMPERATURES ON LAKE SUPERIOR, AND ON THE UPPER PART OF THE OTTAWA RIVER.

Key:

Lake Superior.

(1.) Fort Brady, Saut St. Mary.
Latitude 46° 31′ N., Longitude 84° 25′ W., Altitude 660 feet.
7. 2. 9. Dove corrected.

(2.) North-east angle, Michipicoten.
Latitude 47° 56′ N., Longitude 85° 6′ W., Altitude 660 feet.
8 and 8, by G. Keith, Esq., corrected by Dove's form.

(3.) Thunder Bay, Fort William.
Latitude 48° 23½′ N., Longitude 89° 22′ W., Altitude 660 feet.
8 and 8, corrected by Dove's form.

Lake Temiseaming.

(4.) Hudson's Bay Post, on the Ottawa.
Latitude 49° 19′ N., Longitude 79° 31′ W., Altitude 630 feet.
Sunrise, sunset, and noon by — Severight, Esq., corrected by Dove's form.

	Lake Superior			*L. Temiseaming*
Periods.	(1.)	(2.)	(3.)	(4.)
January	+18.30	+10.63	+5.70	+9.23
February	19.69	16.66	8.22	18.44
March	27.04	26.09	22.72	24.41
April	38.05	34.66	31.42	39.04
May	52.00	51.88	48.87	49.35
June	58.61	55.00	58.73	62.75
July	65.36	57.03	62.19	67.28
August	64.36	60.04	58.84	65.58
September	55.55	49.67	48.16	53.39
October	44.75	44.92	41.88	40.83
November	33.59	29.01	23.43	25.97
December	22.23	22.38	18.16	17.68

Year	41.63	38.25	35.90	38.58
3 Winter months	20.07	16.68	10.75	15.02
3 Spring months	39.04	37.57	39.67	37.58
3 Summer months	62.77	57.39	59.94	65.23
3 Autumn months	44.63	41.24	37.80	40.07
Difference of hottest and coldest months	46.06	49.41	56.49	58.05
Difference of summer and winter months	42.70	40.71	49.19	50.21

Column 1. is extracted from Dove's paper, already referred to; columns 2. and 3. are compiled from documents obtained from the Hudson's Bay Company; and column 4. is extracted from Mr. Logan's Geological Report for 1845-6.

Phenomena illustrative of the Climate of Penetanguishene, on Lake Huron.[80]

The spring sets in very suddenly. Snow continues until the latter end of April, and longer in the forest than in cleared lands. The weather in March is clear and cloudless, and the ice, which in winter has attained a thickness of sixteen inches, begins to dissolve. Towards the end of the month the sap of the maple flows, and the sugar harvest commences. Flocks of Canada geese and various ducks appear about the same time, and are the harbingers of fine weather. The ice disappears on an average on the 24th of April. Alders and various willows flower about the middle of the month, and the *Hepatica triloba* blossoms on the 25th. Potatoes are planted between the 1st and 20th of May, and cucumbers and melons are usually sown between the 25th and the end of the month. *Viola blanda*, *Xylosteum*, *Leontice*, *Erythronium*, and many other plants, blossom in this month; the forest trees come all into leaf about the 16th, and, about the 19th, the moschetoes begin to be troublesome.

In the month of June the temperature rises to 90° F. in the day, and heavy dews fall in the night. Barley and oats are sown about the 15th, and towards the end of the month garden peas are fully podded, and the male flowers of maize spring up. The *Lilium philadelphicum* blossoms at this time.

In July and August the weather is usually dry and sultry. About the beginning of the former month *Penstemon pubescens*, *Rhus typhinum*, garden melons, and cucumbers blossom; and, towards the middle of August, melons grown without artificial warmth are ripe, and the wheat and oat harvest commences. Maize is fit for pulling about the end of the month.

In September numerous flocks of *Turdus migratorius* and other birds arrive from the north, and remain for a time feeding on the berries of various rasp bushes. Maize ripens about the first of the month, and near its end frost destroys the cucumber and melon vines; forest trees change their hue, and potatoes are dug and stored for winter use.

The forest assumes a variety of autumnal hues in the beginning of

October; about the middle of the month, many flocks of geese and ducks pass to the southward, and their appearance precedes a series of cold weather, which strips the leaves from the trees. A fall of snow usually occurs about the 25th.

November is generally calm and pleasant, and about three weeks of peculiar weather, named the "Indian summer," occurs. It is characterised by a fog or haze rising from the earth, through which the sun is seen obscurely, and there is little or no wind. In December, the thermometer sinks a few degrees below zero, and much snow falls. The harbour freezes in the beginning of the month. In January, the thermometer sinks 20 degrees below zero, and rarely to -32°. The snow attains a depth of three feet in the woods, but the ground it covers is not frozen. A great fall of snow takes place in February, and there is usually a temporary thaw about the end of the month, accompanied by heavy rain, and occasionally by thunder.

Phenomena indicating the Progress of the Seasons at Michipicoten, Lake Superior[81], in the year 1840.

Jan. 19. Open water in the bay. Mergansers frequenting it.

Feb. 14. Bay again closed by ice.

March 8. Snow birds departed for the north. 26th. The snow birds returned again, the weather having been severe. Domestic hens began to lay eggs. Two ducks seen.

April 10. Lake clear of ice in Michipicoten Bay. 12th. *Turdus migratorius* came.

May 2. All the snow gone. 6th. Swallows came. 22nd. Potatoes planted.

Sept. 4. Small trout collecting in the rivulets to spawn. On the 23rd they ceased spawning. Frosty nights. Potatoes not hurt. 26th. *Corregonus lucidus* spawning in the river.

Nov. 10. Ice beginning to drift in the river. 18th. The large trout and *Corregonus albus* cease to spawn here at this time, though they carry on this operation later in other parts of the lake.

Dec. 3. Ice broken up in the river. Little snow lying on the ground. 13th. River again frozen over. Season mild.

Phenomena indicating the Progress of the Seasons at Fort William, Lake Superior, in the year 1840.

Feb. 29. Thermometer at noon rose to 39° F.

March 1. Temperature 61° in the middle of the day. On the 27th a grey hawk, and on the 31st a barking crow, *Corvus americanus*, were seen.

April 2. The sap of the sugar maple began to run. On the 4th small holes began to perforate the ice. On the 9th the first wild ducks of the season came, and on the 10th butterflies, blue flies, and gulls were noticed. 20th. The general thaw commences at this period. Ground frozen to the depth of 3 feet 9 inches. 21st. *Anser canadensis*, *Anas boschas*, and mergansers frequenting the neighbourhood. 28th. Heard a nightingale (*Turdus?*). 30th. River partially open.

May 2. River free of ice. Bay of the lake full of drift ice. 6th. *Anser hyperboreus* passing in flocks. 8th. Moschetoes seen. 10th. The birch tree and maple budding.

June 15. Swallows building in the outhouses. 17th. Sturgeons spawning in the rapids of the river. 19th. *Catastomi* beginning to descend the river from the rapids. 21st. *Corregonus lucidus* comes to the entrance of the river in shoals.

July 3. The *Corregoni* have left the mouth of the river. 15th. Barley just coming into ear. Potatoes in flower. The *Lepus americanus* having its second litter of young. 31st. Raspberries ripening.

Aug. 8. Red currants and blue berries (*Vaccinium*) perfectly ripe. 10th. Reindeer begin to rut. 19th. Barley ripening. 29th. Peas quite ripe. 31st. The swallows have disappeared.

Sept. 2. Reindeer rutting season ends. On the 7th the leaves of the birch and aspen change colour. 10th. Small trout begin to spawn. 13th. Potatoes, cabbages, turnips, and cauliflowers nipped by the frost. 14th. A few ducks arriving from the north. 16th. The first stock-

ducks arrived from the north this autumn. 20th. Small trout spawning abundantly on the shoals. 23rd. The orioles have departed for the south. Canada geese arriving from the north, and going southwards. 30th. *Corregonus lucidus* begins to spawn in the rapids of the river.

Oct. 6. The large trout begin to spawn in the lake at the Shaguinah Islands; they cease on the 18th. Thunder. 7th. Leaves of the birch and aspen falling. 10th. The *Corregonus lucidus* has ceased spawning on the rapids. 14th. Thunder. *Anser hyperboreus* arriving from the north. 15th. Passing in large flocks. 20th. Hail, thunder, and lightning. Plovers, divers, snipes, orioles, geese, and ducks in the neighbourhood. On the 31st, snow-birds began to arrive from the north.

Nov. 3. The small lakes frozen over. On the 9th, the river (Kamenistikwoya) covered by a sheet of ice, which broke up again. 21st. The spawning season of the *Corregonus albus* terminates.

Dec. 1. Ice driving about in the lake with the wind. On the 17th, the bay was frozen across to the Welcome Islands.

The following *Notices of the Progress of the Seasons at Fort Vancouver in 1838*[82], may be contrasted with the state of vegetation at the same times of the year in the valley of the St. Lawrence:—

Jan. 2d. Short young grass, affording good pasturage for sheep in places that were flooded in summer. 8th. Berry-bearing bushes budding, such as the wild cherry, black currant, &c. Swans abundant, ducks, geese, and cranes scarce. 10th-12th. Snow fell to the depth of an inch and a half, and vegetation was retarded by unfavourable weather till

Feb. 17. when wild gooseberry bushes were observed budding. Between the 26th of this month and

Mar. 16. Thunder and hail showers occurred. *Ribes sanguineum* blossoming. *Trillium grandiforum*, having the local name in Oregon of "Herb Paris," in full flower. 21st. Apple and pear-trees budding. The wild gooseberry in full leaf, and further advanced than bushes from England cultivated in the garden. 24th. The swallow first noticed. 30th. Humming-birds appearing; strawberries flowering.

A*pril* 3. Mahonia in blossom, and, on the 5th, peach-trees flowering.

8th. Potatoes that have lain in the ground all winter, beginning to show. 11th. Dogwood and elder in blossom. 17th. Several species of violet in flower. 20th. Field iris in flower. 23d. Brambles flowering. On the 25th, clover in bloom; and, on the 26th, wild tares flowered. Hail and thunder storms. 28th. Blossoms of the fruit-trees falling.

May 1. Lupins in flower. 7th. Wild rose and eglantine in flower. 12th. Strawberries ripening. 28th. Field-peas in blossom. 30th. Garden-peas brought to table. Thunder.

June 1. Spring barley in ear. 5th. New potatoes raised from tubers, left all winter in the ground, fit for table. 7th. Oats in flower. 10th. Spring wheat coming into ear. 17th. Bramble-berries ripening. 23rd. Gooseberries, currants, and raspberries ripe. Thunder. 26th. Blackberries (*Vaccinium*) ripe.

July 4. Humming-birds scarce this season. 19th. Barley fit for the scythe. 22nd. Winter wheat ripe. 28th. House-flies numerous.

Aug. 3. Oats ripe. 7th. Field-peas harvested. 9th. Foggy mornings, followed by a clear sky and excessive heat. Dewless mornings succeeded by rain. 12th. Salmon season usually ends. Several cases of ague occurring. 27th. Moschetoes very troublesome. Geese arriving from the north.

Sept. 7. Hail and thunder. 12th. Buckwheat harvested. 13th. Ague prevalent. 19th. Mowed barley that was sowed on the 16th of June —a fair crop. 22nd. Peas sown on the 19th of June, on alluvial land, that was flooded in winter, now ripe.

Oct. 27. The Columbia or Oregon river unusually low, the greatest depth opposite the fort being less than fifteen feet.

Nov. 8. Potatoes killed by the frost. 18th. A little drift ice in the river. 20th. Rain and sleet.

Dec. 26. Snow at this time two inches deep, being the greatest fall this season, and less than usual.

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[80] By the late C. C. Todd, Esq., Surgeon, R. N.

[81] By chief factor George Keith, Esq.

[82] By G. B. Roberts, Esq., of the Hudson's Bay Company.

TABLE IV.

THERMOMETRICAL OBSERVATIONS.—VALLEY OF THE SASKATCHEWAN.

Key:

(1.) Cumberland House.
Latitude 53° 57′ N., Longitude 102° 20′ W., Altitude 900 Feet.
Mean Temperature, 8 A. M., 8 P. M., corrected, 1839.

(2.) Oxford House.
Latitude 54° 55′ N., Longitude 96° 28′ W., Altitude 400 ? Feet.
Mean Temperature, 7 A. M., Noon, and 8 P. M., corrected, 1833.

(3.) York Factory.
Latitude 57° 00′ N., Longitude 92° 26′ W., Altitude 20 Feet.
Mean Temperature, Morning, Noon, and Evening, corrected, 1830.

(4.) Rupert House.
Latitude 51° 21′ N., Longitude 83° 40′ W., Altitude 20 ? Feet.
Mean Temperature corrected, Sunrise, 1½ P. M., Sunset, 1839.

Months and Seasons.	(1.)	(2.)	(3.)	(4.)
June	- -	- -	47.67	
July	- -	- -	59.99	
August	62.84	- -	54.85	
September	44.50	- -	41.90	
October	33.15	17.53	33.43	34.80
November	21.48	13.29	25.17	23.33
December	7.94	-23.06	3.73	15.59
January	-0.89	-22.06	-5.12	-4.09
February	-8.06	-1.90	-6.60	-0.68
March	18.30	8.57	4.77	7.64
April	27.01	28.62	19.21	21.05
May	52.59	38.01	33.53	41.51
Year	33.20	- -	25.63	
Summer	62.62	- -	52.07	

Autumn	33.04	- -	33.50	
Winter	-0.17	-0.82	-2.53	0.14
Spring	32.70	7.51	19.17	0.78
Difference of hottest and coldest months	72.06	- -	66.59	
Difference of summer and winter	61.79	- -	54.60	

The observations recorded in the above table were made at Cumberland House, by chief factor John Lee Lewis, between the beginning of August 1839 and the end of September 1840, the register being deficient in June and July, when Mr. Lewis was travelling on the business of the company. The temperatures were measured by a thermometer made by Newman, and sent out at that time with many others, by the Geographical Society, but at the expense of the Hudson's Bay Company. The monthly means of the combined temperatures at 8 A. M. and at 8 P. M. were corrected by Dove's table, calculated for Toronto. —*Rep. Br. Ass. 1847.*

TABLE V.

Comparative Table of Temperature on East and West Sides of the Continent.

Periods.	Nain. Latitude 57° 10′ N., Longitude 61° 50′ W., Altitude 20 Feet. 3 Years. 8. 12. 4. 8. Dove.	Okak. Latitude 57° 30′., Longitude 66°., Altitude 20 Feet. 2 Years. 8. 12. 4. 8. Dove.	Sitka. Latitude 57° 3′ N., Longitude 135° 18′ W., Altitude 20 Feet. 2½ Years. Reduced. Bäer.
June	42.53	44.65	53.83
July	50.18	51.65	57.11
August	50.99	52.00	57.79
September	44.98	44.45	55.96
October	33.98	31.15	46.63
November	26.51	22.40	42.89
December	6.51	8.45	36.32
January	0.95	2.15	34.18
February	3.51	1.95	33.60
March	7.52	8.25	38.01
April	29.97	29.00	40.64
May	36.23	38.25	48.18
Year	27.82	27.86	45.44
Summer	47.90	49.43	56.24
Autumn	35.16	32.67	48.49
Winter	3.66	4.18	34.74
Spring	24.57	25.17	42.28
Difference of hottest and	50.04	50.05	24.19

coldest months			
Difference of summer and winter	44.24	45.25	21.50

The observations at Oxford House were made between October 1833 to May 1834, at 7 A. M., noon, and 8 P. M., and these are also corrected by Dove's formula for Toronto.

The register for York Factory, Hudson's Bay, was kept by chief factor Joseph Charles, from June 1830 to end of May 1831, the temperatures being recorded in the morning, noon, and afternoon, but the exact hours of the morning and evening are not specified. They have been corrected by Dove's table, on the supposition that the hours were sunrise and sunset.

The observations at Rupert House, on the east side of James's Bay, were made at sunrise, an hour and a half after noon, and at sunset, and Dove's corrections have also been applied to them.

An examination of the several columns will show clearly the effect of open water in Hudson and James's Bays, in tempering the atmosphere in the months of October, November, and even December, and of the presence of ice in those seas, keeping down the summer heat.

TABLE VI.

Abstract of a Record of Temperatures of the Air in the Shade, kept by Mr. Drummond, at Edmonton House, Lat. 53° 40′ N., Long. 113° W., Alt. 1,800 Feet.

	Monthly Means			Extreme Temperatures.	
Months.	Of Maxima.	Of Minima.	Of these.	Highest.	Lowest.
1827.					
Jan.	18.68	3.42	11.05	+42.0	-27.0
Feb.	29.96	3.68	14.32	+47.0	-25.0

TABLE VII.

Abstract of a Journal of Temperatures kept at Carlton House by the Author, Lat. 52° 51′ N., Long. 106° 13′ W., Alt. 1,100 Feet.

	Monthly Means			Extreme Temperatures.	
Months.	Of Maxima.	Of Minima.	Of these.	Highest.	Lowest.
Feb., last 10 days	12.50	-1.20	5.65	31.0	-29.0
March	23.10	+0.74	11.92	42.0	-26.0
April	40.97	18.53	29.75	59.0	+2.0
May	61.90	33.95	47.92	75.0	+22.0

TABLE VIII.

Table of the Extreme Temperatures occurring in each Month at several Places in the Saskatchewan Valley, and in Hudson's and James's Bays.

	Cumberland House Latitude 53° 57′ N., Longitude 102° 20′ W., Altitude 900 Feet.		Oxford House Latitude 54° 55′ N., Longitude 96° 28′ W., Altitude 400 Feet.		York House Latitude 57° 00′ N., Longitude 92° 26′ W., Altitude 20 Feet.		Rupert Hous Latitude 51° 21′ N., Longitude 83 40′ W., Altitude 20 Feet.	
	Highest Temp.	Lowest Temp.	Highest Temp.	Lowest Temp.	Highest Temp.	Lowest Temp.	Highest Temp.	Low Temp
June	87	42	- -	- -	83	25		
July	98	47	- -	- -	96	35		
August	90	49	- -	- -	79	40		
September	73	30	- -	- -	70	28		
October	68	5	49	-3	58	19	61	13
November	38	-10	39	-6	42	8	36	-10
December	25	-26	32	-29	30	-30	37	-5
January	25	-32	0	-44	19	-34	16	-32
February	34	-35	30	-33	37	-35	39	-36
March	50	-9	34	-27	47	-25	34	-25
April	55	-3	64	-8	55	-9	53	-16
May	93	27	65	15	62	15	71	19

This table shows that tropical temperatures occur in the Saskatchewan basin, for a day or two, or it may be only for a few hours at a time in summer, yet that the three summer months seldom pass without night frosts. These destroy tender plants, and in untoward seasons injure the growth of *cerealia*. Wheat, however, ripens well in the drier limestone districts, and still better in the prairie country; but it is

there subject to periodical ravages of the larvæ of caterpillars, which come like an army of locusts, and eat up all that is green. Were the country more generally cultivated, and rooks and domestic poultry encouraged, this plague might be lessened. Maize ripens well at the Red River and Carlton, and, I believe, at Cumberland House also, though I did not see it in cultivation there. The 54th parallel may be considered as its northern limit, but its profitable culture does not, perhaps, extend beyond the 49th or 50th degree on the east side of the Rocky Mountains.

In the following Table of Phenomena, indicating the *Progress of the Seasons at Cumberland House*, I have combined my own observations in the spring of 1820 with those of chief factor John Lee Lewis, in 1839 and 1840, distinguishing the remarks by the years. The supposed altitude of Cumberland House above the sea is 900 feet, according to Captain Lefroy's calculations.

March 4. Water collecting in pools round the establishment. 1840.

7. Much bare ground visible.

8. The snow which covered the ground to the depth of three feet, was observed to moisten in the sun for the first time this season. 1820.

12. Temperature in the shade rose for the first time to + 30° F. The melting snow began to drop from the eaves of the houses.

21. Patches of earth became visible, the season being in respect to the melting of the snow fourteen days later than that of 1840. The river Saskatchewan broke up partially, the melting snow covered with *Podurœ*, as it is also frequently in the autumn.

24. A white-headed eagle was seen, this being almost always the first of the summer birds which arrives; it comes as soon as it

can obtain fish. In 1840, the first eagle was seen on the 26th.

April 2. The river Saskatchewan froze over again, after some very cold days.

7. Barking crows (*Corvus americanus*) seen. They were not observed till the 19th in 1840.

8. First snow bunting seen (*Emberiza nivalis*). 1840.

9. A merganser seen. 1820.

10. Willow catkins beginning to burst.

12. Geese and swans seen in 1820. In 1840 they were not seen till the 20th; and pelicans and ducks were observed that year on the 21st.

13. Buds of *Populus balsamifera* bursting. 1820.

17. Plovers, grakles, and orioles seen, and, on the following day, Canadian jays and fly-catchers. Frogs croaking.

20. Coltsfoot, *Nardosmia palmata* flowering.

26. Alder flowering. The sugar harvest, which is collected in this district from the *Negundo fraxinifolium*, commenced in 1820, on the 20th of this month, and lasted till the 10th of May. The flow of the sap is greatly influenced by the direct action of the sun, and is greatest when a smart night's frost is succeeded by a warm sun-shining day. The flow ceases in a cold night.

28. The Saskatchewan thoroughly broken up. The ice on Pine Island Lake did not disappear until nearly a month afterwards. Wahlenberg observes that the mean temperature of the air in Lapland must rise to 40° F. before the rivers are completely free. The Saskatchewan opens in this district before the mean heat for ten days rises so high; but its upper part flows from a more southerly and warmer, though a more elevated, country.

30. Commenced ploughing. 1840.

May 1. *Anemone patens*, or wind flower, in blossom, its leaves not yet expanded. 1820.

2. A fall of snow to the depth of two feet. 1840.

13. Planting potatoes.

14. Sowing barley. 1820. *Negundo fraxinifolium* and gooseberry bushes in flower.

17. Willows, gooseberries, aspens (*Populus tremuloides*) in leaf. Various *Drabæ* in flower. 1820. In 1840 the trees were bursting their buds at this time.

17. Wheat sown on the 8th of this month, above ground to-day, having germinated in nine days. 1840.

21. Barley sown on the 14th above ground, having taken seven days to germinate.

22. Leaves of the trees expanding rapidly.

24. *Ulmus americana* flowered. 1820.

Pine Island Lake clear of ice. 28th. *Prunus pennsylvanica*, *P. virginiana*, and Amelanchier in flower. 30th. From the 23rd to the 30th of this month in 1840, the temperature in the shade at 2 P.M. varied between 78° F. and 93° F. On the 30th, potatoes planted on the 13th appeared above the ground. 1840.

25.

June 12. All the forest trees in full leaf. 1820.

Commenced reaping barley. On the 15th, 18th, 19th, and September 1., the thermometer at noon ranged between 80° and 90°, being the hottest days in the month. There was much thunder and hail on these days. 1839.

Aug. 1.

Flocks of water-fowl beginning to arrive from the north. 3rd. The first fall of snow this autumn. 4th. Vast numbers of water-fowl flying southwards. A severe fall of snow and frost in the north causes these birds to hurry to the south. 11th. First hoar-frost. Birch and aspen leaves turning yellow. 14th. Wild-fowl numerous. 20th. Snow; 21st, ditto very heavy. 24th. Thunder and lightning.

Sept. 2.

Taking up potatoes. 5th. Leaves all fallen from the deciduous trees. On the 11th, thermometer at 2 P.M., in the shade, 68° F., being unusually high.

Oct. 1.

14. Water-fowl passing southwards in large flocks. 1839.

Bays of the lake frozen over. 16th. The ground frozen hard. 17th. Last water-fowl seen this season. 18th. Lake entirely frozen over. In 1839, the Little River was frozen over on the 24th of this month, but broke up again in part, and remained partially open all the winter.

15.

31. Waveys (*Anas hyperborea*) passing. Lake partially opened.

The following are the *Phenomena of the Spring of 1827 at Carlton House*, in lat. 52° 51′ N., long. 106° 13′ W., on the eastern limits of the Saskatchewan prairie lands, and at an elevation above the sea of about 1,100 feet.[83]

Feb. 15. Snow thawing in the sunshine, and on the 17th many sandy hummocks on the plains were bare. This is at least three weeks earlier than the thaw commences in an early season at Cumberland House, which is a degree further north, but is 200 feet lower.

March 6. Trees thawed in fine days, and on the 8th the black earth on the immediate banks of the river was softened to the depth of two inches by the power of the sun's rays. At this place the westerly winds bring mild weather, and the easterly ones are attended by fog and snow.

13. Sparrow-hawks (*Falco sparverius*) arrived from the south, and on the 17th several migratory small birds were noticed.

29. Large flocks of snow-birds (*Emberiza nivalis*) came about the establishment; and, by the 31st, steep banks, which had a southern aspect, were clear of snow.

April 1. Many *Fringillidæ* (birds of the sparrow tribe) were seen. On the 2nd, swans arrived, and, by the 3rd, much snow had disappeared from the plains.

4. The snow at this time was melting in the shade, and the sap of the maple trees (*Negundo fraxinifolium*) began to flow.

April 6. Geese arrived. Stormy weather, about the middle of the month, retarded the arrival of the summer birds; but the plants continued to grow fast. On the 20th, the Telltale plover

(*Charadrius vociferus*) and several small birds came.

22. *Turdus migratorius*, *Pyrrhula ludoviciana*, and *Lanius excubitor* were seen, and the flowers of *Anemone patens* expanded.

27. Ice in the river Saskatchewan gave way. Frogs began to croak.

28. Canada cranes (*Grus canadensis*) arrived.

May 1. *Sturnus ludovicianus* arrived, and the last flocks of *Emberiza nivalis* departed for the north.

2. On this day, *Icterus phœniceus* and *Scolecophagus ferrugineus* were seen, and most of the water-fowl had by this time arrived. On the 4th, *Phlox hoodii* flowered.

5. *Ranunculus rhomboideus*, *Viola debilis*, *Nardosmia palmata*, and several carices flowered.

6. *Hirundo viridis* and many gulls arrived.

7. On this day the sap of the ash-leaved maple, which had flowed scantily for ten days, ceased to run altogether, and the sugar harvest closed. *Avocetta americana* arrived. *Populus tremuloides* in flower.

9. Crow-blackbirds were first seen. *Corydalis aurea*, *Corylus americana* and *rostrata*, *Hippophäe canadensis*, *Thermopsis rhombifolia*, *Vesicaria arctica*, and *Alnus viridis* flowered. 12th. *Potentilla concinna*, *Townsendia sericea* flowered. 14th. Gooseberry bushes coming into leaf. Ash-leaved maple flowering, seven days after the sap had ceased to flow from wounds in the stem. 16th. The *Picus*

varius arrived in considerable numbers, and on the 19th the *Viola nuttalliana* flowered.

The average antecedence of spring phenomena at Carlton House to their occurrence at Cumberland House is between a fortnight and three weeks. The difference of latitude, which is only one degree, is nearly counterbalanced by 200 feet of greater altitude; but the dry sandy soil of the plains, which are early denuded of snow, gives the spring there a great superiority over that of the lower country, where the ground is almost submerged, and the greater part of it icebound for a month after the river is open.

I obtained no other register of temperatures at Edmonton House, or from the country near the base of the Rocky Mountains in that parallel, than the daily maxima and minima for two winter months observed by Mr. Drummond in 1827. These are included in the subjoined table; and it will be observed that the winter, as far as we can judge from a few isolated observations, is even milder at Edmonton than at Cumberland House, though it is on the same parallel and at a much greater altitude. Edmonton House is in latitude 54° N., and longitude 113° W., and its elevation above the sea is estimated by Captain Lefroy, from his observations on the boiling point of water, at 1,800 feet.

Neither have I been able to procure registers of temperatures kept at any post in the southern parts of the Saskatchewan basin. The Red River Colony extends to the boundary line of the United States, or the 49th parallel; and I have been informed that the *Fagus ferruginea*, or American beech, grows within the limits of the settlement, though it does not exist on Lake Superior, but terminates in that direction at Michilimackinac, on the 46th parallel. In the interesting account of the Alps of New Hampshire by Professor Agassiz, the trees which grow in the zone comprised between the elevations of 830 and 1,500 feet above the sea are the same kinds which grow on the Red River and forks of the Saskatchewan at nearly as great altitudes, and from five to ten degrees further north; with the addition of the oaks, which find their northern limit on Lake Winipeg, though they do not enter the corresponding New Hampshire zone. The same trees, however, if I understand the passage in the work on Lake Superior (p. 186.) to which I here refer, continue to ascend the New Hampshire Mountains to the height of 2,080 feet; above

which, to the height of 4,350 feet, the vegetation consists almost entirely of *Abies alba* and *balsamea*, and *Betula excelsa* and *papyracea*. *Betula excelsa* scarcely reaches the Saskatchewan basin, or, if it does, is rare even in the southern parts; but the other trees here named go northwards on the Mackenzie till the 69th parallel, and terminate there on coming within the direct influence of the winds blowing from the Arctic Sea. The summits of the New Hampshire Alps 6,280 feet high, present a truly arctic flora, much more so, I believe, than the slope of the Rocky Mountains at that elevation on the 52nd parallel. On this point, however, I cannot speak with any confidence, as I have no measurements of the heights at which Mr. Drummond gathered his plants, and he is the only authority for the botany of that district.

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[83] This was estimated in 1827 at 1,000 feet from the length of the river course between Carlton House and York Factory, making a smaller allowance per mile for the descent, as far as Lake Winipeg, and a considerably greater one for the falls and rapids of Nelson River. It accords sufficiently with Captain Lefroy's observations; and its error does not probably exceed 200 feet at most.

That I may carry on as complete a view of the climate of the country as I can produce from the observations of others as well as from my own, I introduce here a table drawn up by a very intelligent officer of the Hudson's Bay Company, chief factor George Barnston[84], giving the progress of the seasons at Martin's Falls. This post is situated in lat. 51° 32′ N., long. 86° 39′ W., on Albany River, about 200 geographical miles in a direct line from the coast of Hudson's Bay, an equal distance in a westerly direction from the water-shed between the Albany and Winipeg Rivers, and somewhat less from the beach of Lake Superior bearing south. According to Mr. Barnston's remark which follows, the country about the falls is similar in its geological character to the west side of Lake Winipeg, and referrible to the silurian epoch. "Our geological position," says that gentleman, "is upon the confines of the great basin of James's Bay, an immense extension of the older calcareous strata.

Between the ‘falls’ and the coast the bed of the river is composed of limestones and clays, both containing extinct genera of shells; while above, towards the interior, little is to be seen but gneiss and greenstone schist, with a mixture here and there of less fissile granite rocks. The fossils I have been able to procure in this neighbourhood are principally spirifers, producta, terebratula, and impressions of trilobites. Although in winter we have the cold of Russia, in the months of July and August we enjoy the climate of Germany and the north of France.” (Barnston, l. c.) A reference to the map will show that there is a canoe route from Winipeg River through Lake Sal, and by a portage over the water-shed to Lake Saint Joseph, and Albany River, and also a shorter one from the Peek River on Lake Superior to the southern tributaries of the Albany. In short, as has been already frequently stated, the primitive rocks forming the brims of these several river basins are traversed in every direction by sheets of water occupying more surface than the rocks themselves.

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[84] Mr. Barnston having sent me this paper in 1840, I published it in the Edinburgh Philosophical Journal for April, 1841.

On the Progress of the Seasons at Martin’s Falls.

Dec.
Jan.
Feb.

We are frequently visited in these dead winter months by the white owl (*Strix nyctea*) from James’s Bay, but the hawk owl (*Strix funerea*) is our most common bird of prey. *Tetrao umbellus*, *T. canadensis*, and *T. phasianellus* are residents in this district the whole year. The *Tetrao saliceti*, or willow ptarmigan, is a winter visitor which comes from the north.

March.

Martens (*Mustela martes*) pair, and soon afterwards rabbits (*Lepus americanus*).

In the middle of the month the snow often melts in the

height of the day, and by the 20th a snow-bird (*Emberiza nivalis*) may be seen occasionally if the season be early.

Tops of the higher grasses, which have been concealed beneath the snow, begin to show. A few brown feathers clothe the necks of the willow grouse, and these birds leave us.

April. A slight crust now forms on the snow, produced by night frosts after thaw in the day. In mild weather, a few insects show in the sunshine.

Two species of *Perla* and one of *Nemoura* come up through the crevices of the ice and porous snow, and all proceed straight to the nearest beach. The cold renders them too weak to fly, though most of them have got rid of their nymphine investments before emerging from the ice.

Snow-birds have become plentiful, and are now joined by the *Emberiza lapponica* and *Alauda alpestris*. 20th. The flesh-fly is still scarce. The small owl (*Scops*) calls in the warm nights, and the common woodpecker (*Picus pileatus*) drums on the hollow trees. 22nd. The Canada goose (*Anser canadensis*) and stock-ducks (*Anas boschas*) sometimes arrive at this date, but are frequently forced to return for want of water, and by northerly blasts.

A few spots of ground bare; (more than a month later than the earth begins to appear at Carlton House.) 28th. The red-breasted thrush (*Turdus migratorius*) and cattle blackbird (*Scolecophagus ferrugineus*), are now arriving, and pick up the benumbed grubs and caterpillars. Goshawks arrive.

Snow melting rapidly. Ground getting barer. 5th. Wild

geese and ducks passing to the northward. Hawks still arriving. 10th. Every fine day brings an accession to the small bush birds, fly-catchers, &c. Food for these is still scarce, and they approach the houses in quest of *Dipteræ*,

May 1. which rise from the manure and rich earth round the place. Snow-birds have left us, and ermines and hares (*Lepus americanus*) are becoming altogether brown. The ice is now shingly and dangerous, and strong currents and rapids are open. Wavies (*Anser hyperboreus*) and brents (*Anser bernicla*) passing towards James's Bay in large flocks. No weather stops them after this time.

The northern diver (*Colymbus glacialis*) and several black ducks (*Anas nigra*, *fusca*, and *perspicillata*) are still scarce, but are sometimes seen. The buds of the balsam poplar, aspen, and of various willows, swell. On the latter

12. may be found the earliest *Tenthredines*, the larvæ being nursed in the tender bud. Two species of butterfly (*Vanessa* and *Argynnis*) sport over the ice and snow, when these are not gone.

The larger rivers break up. (The Saskatchewan opens about twenty days earlier at Carlton House). Fish ascend the small streams to spawn. The pike (*Esox lucius*) and dorè (*Lucioperca*) spawn. Sucking-carp (*Catastomi*) soon follow them. Trout take bait greedily. The cliff-

15. swallow (*Hirundo fulva*, Vieillot) is seen. (On May 28th, 1849, Mr. Rae found this swallow on the banks of the Coppermine, having constructed its clustered nest against the cliffs at the mouth of Kendall River, lat. 67° N., but not yet laid its eggs.) Swamps and stagnant pools are thawed. Frogs begin to croak, and moschetoes to bite.

Shells (*Limnæi*) begin to move in the pools along the river. Snails (*Limax*, *Helix*, *Bulimus*, &c.) remove from under

20. stones and fallen timber. The end of the month discloses

some species of moths (*Noctualites*).

Our only goatsucker (*Chordeiles virginianus*), and the golden-winged woodpecker (*Colaptes auratus*), the last
25. of the spring birds in this district, arrive. Beavers, otters, and musk-rats have their young.

The balsam poplar, and aspen expand their leaves. (Not so
28. early as on the Saskatchewan, two or three degrees further north.) The Hudson's Bay reindeer has young.

Sturgeon begin to frequent falls and rapids, and to spawn. 5th. Insects are busy on warm days; the *Tenthredinidæ* on bushes, the *Sphingides*, *Andrenetæ*, and *Pangoniæ* on the
June 1. ground, all attended by a variety of parasite ichneumons. The first flowers blow, and those of the willow are surrounded by *Sylphides* and flower-flies (*Anthomoyæ*).

A night-frost will sometimes intervene, even at this late period; and, in the woods, the ground is still frozen solidly at the depth a foot from the surface. Vegetation, nevertheless, still goes forward. Moschetoes become a
10. torment; the swamps and puddles swarm with their larvæ. Small tadpoles abound in the pools. 13th. The country is now covered with verdure. Birds are nestling; geese and ducks hatching. The natives are occupied with the sturgeon fishery.

The latest shrubs are in leaf, and the majority of moths and butterflies are disclosing themselves. The large *Ephemeræ* (*Perlæ* and *Phryganeæ*) issue from the water. 20th. Trout
15. take the fly-hook. White-fish (*Coregonus albus*) rise to the surface. Cattle seek the houses to get rid of the tormenting *Tabani*. In dry seasons rivulets become low, though rivers

retain their strength.

July.

Our warmest month. The river unusually gets low. Sturgeon fishing continues. Cattle become lean, being tormented by flies in the day, and feeding in the night only. 10th-20th. Many genera of *Coleoptera* appear, some of them of forms more characteristic of warmer climes; *Cicindelæ*, *Necrophori*, many *Buprestes*, and a species allied to *Lucanus*. Of those whose larvæ live on wood, the *Serropalpus*, a very fine *Dorcacenis*, *Cerambyx*, *Callidium*, *Lamia*, and numerous species of *Lepturetæ*. *Neuroptera* are abundant on the banks of the river —*Libellulæ*, *Agrion*, &c.; and on the leaves *Hemerobius*, *Panorpes*, *Sialis*. In the other orders, also, there are many genera to keep up the character of the month. It ends with bringing in strawberries, and in sending off sturgeon, which return to the depths.

Aug.

The raspberries begin to ripen. Young ducks are well feathered. We have sultry weather for a few days, and then thunder-storms followed by chilly nights. 10th. Pigeons (*Ectopistes migratorius*) are numerous. Young geese (*Anser canadensis*) can fly. Gnats decrease, and sand-flies (*Similium*) replace them.

15.

The raspberries, and red and black currants ripen. Grasshoppers are full grown. Trout move about, ascending the river. Sturgeon are very scarce. Grass becomes brown in dry situations. 20th. The noisy lesser tell-tale (*Totanus flavipes*) appears, and if we have much rain we are visited by a species of snipe. The golden and ring-necked plovers are not uncommon.

Sept.

The air is generally cooler and the wind stronger, and frosty

nights may be expected.

Trout spawn. Many insectivorous birds depart. The
10. passenger pigeon disappears. Hawks and the large horned owl (*Strix virginianus*) are common. Night frosts frequent.

Tops of potatoes always blackened. Caterpillars nearly all cased. Trout refuse the fly-hook, but still take bait; they are now poor fish. Canada geese pass to the southward. Ducks abound in the grassy lakes. Leaves turning yellow
15. rapidly. 20th. Pleasant weather at mid-day but cold in the night. The fall-moth (*Phalæna autumnalis*) is now to be seen. Sand-flies bite only in the height of the warmer days. The moscheto is utterly defunct. Diving ducks common; the others gone.

Pools and swamps crusted with ice. White-fish (*Coregonus albus*) begin to spawn, 5th. Sucking-carp
Oct. 1. (*Catastomi*) and trout desert the small streams. Foliage is yellow, and falls. Deer rut. Instead of rain we have snow, which generally melts, the earth being warmer than the atmosphere.

A single blast of northerly wind will now suffice to bare the trees, strip the shrubs, and send all water-fowl to the south.
10. The last of these are weak or lingering flocks of wavies (*Anser hyperboreus*), which may be observed passing. They seldom alight unless when met by adverse winds.

The small lakes and rivers sometimes frozen. (Between the 21st and 28th is the usual period for the freezing of the lake at Cumberland House.) Tullibee (*Coregonus artedi*)
20. spawns. Quadrupeds acquire thick fur. The willow-grouse (*Tetrao saliceti*) arrives from the north. There is usually a little snow on the ground; and the American hare and

ermine are becoming white.

Nov. 1. The ground is covered with snow, which in mild weather harbours multitudes of *Podurœ*. 10th. I have frequently observed at this time, and later, a wingless tipula (*Chionea hiemalis*) crawling about. 20th. Large rivers and the lakes often solidly frozen; strong rapids filling with ice, and setting fast. American hares and ermines entirely white. Swamps passable, and winter fairly set in.

(Geo. Barnston.)

The following abstract of temperatures, ascertained by John Rae, Esq. in 1846-7, at Fort Hope, Repulse Bay, 62° 32′ lat., 86° 56′ long., which was accidentally omitted to be inserted in Table XII., is placed here, the space being convenient for its reception.

The observations were made eight times in the twenty-four hours, at equal intervals; and the house was situated only a few feet above the sea level.

Sept. 28.57	Dec. -19.27	March -28.10	June 31.38
Oct. 12.56	Jan. -29.32	April -3.95	July 41.46
Nov. 0.68	Feb. -26.68	May 17.88	August 46.32
Aut. 13.81	Winter -25.04	Spring -4.73	Summer 39.59

Mean heat of the year 1846-7 6.14° Fah.

Difference of hottest and coldest months 75.64

„ summer and winter 64.63

TABLE IX.

Temperatures between the Parallels of 52° and 61½° North Latitude.

	Churchill. Latitude 59° 02′ N., Longitude 93° 10′ W., Altitude 20 Feet. Year, 1838-39. Morning, Afternoon, Evening. Corrected by Dove's formula.	Greenland. Fredericksthal. Latitude 60° N., Longitude 45° W., Altitude 20 Feet. Dove.	Pelly Banks. Latitude 61° 30′ N., Longitude 130° W., Altitude 1,400 Feet. 5 months, 1848, 1849. Sunrise, 3 P. M., Dusk. Corrected.
Periods.	(1.)	(2.)	(3.)
January	-21.21	19.62	-21.95
February	-7.31	18.72	-14.73
March	-4.63	22.10	-0.99
April	16.29	27.50	20.44
May	28.42		
June	44.69		
July	56.80		
August	53.39		
September	36.03		
October	26.50	32.45	
November	3.32	35.15	
December	-14.00	29.75	-13.98
Year	18.19	30.00?	
Winter	-14.17	22.70	-16.88
Summer	51.63		
Spring	13.36		
Autumn	21.95		
Difference of hottest and	78.01		

coldest months Difference of summer and winter	65.80		

No. 1. The register at Churchill was kept by Mr. Harding, of the Hudson's Bay Company's Service, from February, 1838, to May, 1839, the observations being made daily in the morning, afternoon, and evening. Column 2. is extracted from Dove's table; and for column 3. I am indebted to Murdock M'Pherson, Esq., who sent me a register kept at Pelly Banks by R. Campbell, Esq.

TABLE X.

Thermometrical Observations in the Valley of the Mackenzie; in Greenland; and on the Yukon.

Key:
(1.) Godhaab.
Latitude 64° 10′ N., Longitude 52° 24′ W., Sealevel.
(2.) Fort Chepewyan.
Latitude 58° 43′ N., Longitude 118° 20′ W., Altitude 700 Feet.
(3.) Fort Resolution.
Latitude 61° 10′ N., Longitude 113° 51′ W., Altitude 500 Feet.
(4.) Fort Simpson.
Latitude 61° 51′ N., Longitude 121° 51′ W., Altitude 400 Feet.
(5.) Fort Reliance.
Latitude 62° 46′ N., Longitude 109° 00′ W., Altitude 650 Feet.
(6.) Fort Enterprise.
Latitude 64° 28′ N., Longitude 113° 06′ W., Altitude 850 Feet.
(7.) Fort Franklin.
Latitude 65° 12′ N., Longitude 123° 13′ W., Altitude 500 Feet.
(8.) Fort Confidence.
Latitude 66° 54′ N., Longitude 118° 49′ W., Altitude 500 Feet.
(9.) Yukon.
Latitude 66° N., Longitude 147° W., Altitude 200 ? Feet.

Periods.	(1.)	(2.)	(3.)	(4.)	(5.)	(6.)	(7.)	(8.)	(9.
January	12.38	-8.76	0.42	-12.54	-25.00	-15.57	-23.33	-21.57	-2(
February	12.56	-4.01	-25.60	-9.06	-18.84	-25.88	-16.75	-21.52	-2(
March	15.60	3.08	9.95	5.55	-6.14	-13.48	-5.38	-20.21	-1[
April	22.01	19.80	12.88	26.28	8.23	5.78	12.35	-4.71	12
May	32.16	45.40	40.14	48.16	36.03	31.20	35.18	- -	41
June	39.09	55.00	- -	63.64	- -	- -	48.02	- -	53
July	41.92	63.00	- -	60.97	- -	- -	52.10	- -	65
August	40.84	58.10	- -	53.84	- -	- -	50.56	- -	59

September	35.65	43.53	- -	49.10	- -	31.59	41.00	- -	38
October	29.84	33.00	26.06	24.28	20.70	21.75	22.47	19.43	21
November	21.94	19.13	12.04	8.53	13.44	-1.70	-0.11	-3.68	-8.
December	17.49	2.76	-2.59	-8.36	-17.07	-30.54	-10.88	-38.69	-1
Year	26.79	27.52	21.00?	25.75	16.00?	17.94	17.75	9.00?	14
Winter	14.14	-3.34	-8.09	-10.00	-16.97	-24.00	-17.00	-27.26	-2
Summer	40.62	58.70	- -	59.48	- -	55.00?	50.41	- -	56
Spring	23.26	22.76	20.99	26.66	12.21	23.50	12.69	- -	14
Autumn	29.14	31.89	- -	27.34	- -	17.21	21.15	- -	17
Difference of hottest and coldest months	29.54	71.76	- -	76.18	- -	86.88?	74.43	- -	92
Difference of summer and winter	26.48	62.04	- -	69.48	- -	79.00?	67.41	- -	80

No. 1., extracted from Dove's table, Seventeenth Rep. Br. Ass. p. 376., gives the temperature of the west coast of Greenland in that parallel, and is inserted for comparison.

No. 2. is compiled from 3½ years' observation by Messrs. Keith and Stewart in 1825 and 1826, and by another officer in 1838 and 1839. In the latter case, the times of observation were eight and eight, and the correction for these hours, calculated by Dove for Toronto, has been applied. The summer months were not entered in the register on the second occasion. Observations were also made at 2 P. M., and are recorded in another table.

No. 3. is abstracted from a register of observations made at eight and eight, in the winter and spring: Dove's correction has been used.

No. 4. is an abstract of 2½ years' observation by Murdock M'Pherson, Esq. in 1837, 1838, 1839, and 1840, at eight and eight, with Dove's correction for Toronto applied.

No. 5. is compiled from Sir George Back's observations in 1834, (fifteen daily.)

No. 6. is abstracted from a register kept at Fort Enterprise in 1820,

1821, and 1822. The summer observations are defective; but the mean summer heats are inferred from observations made in travelling over the barren grounds further north.

No. 7. Two years' observations at Fort Franklin; first year nineteen observations daily, except in summer, during which, and in the second year, six observations daily at equal intervals.

No. 8. Fifteen to seventeen observations, daily.

No. 9. Observations at six and six in summer; and in winter as early as the thermometer could be read in the morning, and as late in the evening. Dove's correction for these hours at Toronto has been applied.

TABLE XI.

Table of the Summits of the Daily or Monthly Curves of Temperature in the Valleys of the Missinipi, Mackenzie, Yukon, and Pelly, between the Parallels of 58¾° and 66° 54′ N., expressed in Degrees of Fahrenheit.

Key:

(1.) Fort Churchill.
Latitude 59° 02′ N., Longitude 93° 10′ W., Sealevel.
Mean Temperature at 2 P. M.

(2.) Fort Chepewyan.
Latitude 58° 43′ N., Longitude 118° 20′ W., Altitude 700 Feet.
Mean Temperature at 2 P. M.

(3.) Fort Resolution.
Latitude 61° 10′ N., Longitude 113° 51′ W., Altitude 500 Feet.

(4.) Fort Simpson.
Latitude 61° 51′ N., Longitude 121° 51′ W., Altitude 400 Feet.
Mean Temperature at 2 P. M.

(5.) Fort Enterprise.
Latitude 64° 28′ N., Longitude 113° 06′ W., Altitude 850 Feet.
Mean = Means of Maxima.

(6.) Fort Franklin.
Latitude 65° 12′ N., Longitude 123° 13′ W., Altitude 500 Feet.
Mean Temperature at 2 P. M.
2 Years Monthly Maxima

(7.) Fort Confidence.
Latitude 66° 54′ N., Longitude 118° 49′ W., Altitude 500 Feet.
Mean Temperature at 2 P. M.

(8.) Yukon.
Latitude 66° N., Longitude 147° W., Altitude 200 ? Feet.
Mean Temperature at 1 P. M.

(9.) Pelly Banks.
Latitude 61° 30′ N., Longitude 130° W., Altitude 1,200 Feet.
Mean Temperature at 3 P. M.

Mean.: Mean Temperature.
Max., Mx: Monthly Maxima.

Periods.	(1.)		(2.)		(3)	(4.)	(5.)		(6.)		(7.)		(8.)	
	Mean.	Mx	Mean.	Mx	Max	Mean.	Mean.	Mx	Mean.	Max.	Mean.	Max.	Mean.	M
January	-16.48	-2	-7.04	22	20°	-17.55	-9.68	20	-21.53	11.8	-17.83	26.0	-27.58	1
February	-1.18	42	3.21	44	2	-1·68	-19.10	1	-8.24	27.8	-16.49	27.0	-23.55	1
March	8.51	37	16.72	47	37	12.68	-0.90	24	1.71	31.8	-7.45	12.8	-0.94	2
April	31.66	58	39.12	65	32	47.22	16.40	40	23.21	49.0	6.70	24.5	19.43	5
May	37.94	65	33.33	76	64	56.98	42.80	68	41.65	69.0	- -	- -	48.81	7
June	55.17	82	62.00	97	-	73.40	- -	-	51.00	75.0	- -	- -	62.00?	
July	66.81	86	69.00	78	-	70.61	- -	-	59.02	80.0	- -	- -	74.84	7
August	62.97	83	66.10	72	-	65.87	- -	-	56.88	74.0	- -	- -	70.94	8
September	54.09	84	46.00	65	-	60.00	39.30	53	44.82	66.0	- -	- -	52.73	6
October	33.32	46	41.06	56	47	30.08	27.90	37	23.75	47.0	22.42	32.0	9.49	5
November	8.00	23	16.71	39	31	12.51	2.80	25	4.81	32.5	0.41	19.0	-5.40	2
December	-9.77	5	4.95	40	20	-7.98	-25.80	6	-12.07	27.5	-32.53	-7.0	-5.39	2
Year	27.59	86	32.61	97	-	33.51	- -		22.09	80	- -	- -	23.89	8
Winter	-9.14	-	0.38	44	20	-9.37	-17.15	20	-14.14	27.8	-22.28	27	-22.70	2
Summer	61.65	-	65.70	97	-	69.96	- -	-	55.64	80	- -	- -	69.28	8
Spring	26.04	-	29.72	76	64	38.89	- -	-	22.18	69	- -	- -	22.71	7
Autumn	31.80	-	34.59	65	-	34.15	23.33	-	24.45	66.5	- -	- -	26.03	6

Progress of the Seasons at Fort Franklin, on Great Bear Lake, in lat. 65° 12′ N., long. 123° 12′ N.

The mean temperature of the three winter months varies comparatively little in different years; but the relative temperatures of these months differ greatly among themselves, so that in one year December is the coldest month, in another February, and in a third January. In some years the temperature of places exposed to the sun rises for a day or two in winter above the freezing point, and the snow moistens on the surface; but in other winters no thaw whatever occurs.

In March the snow is deepest, and averages about three feet, being, however, often drifted to a much greater thickness under cliffs and on the borders of lakes. In the end of March or beginning of April trees begin to thaw, the mean temperature in the shade being about zero Fah.; but the effect of the sun's rays on the blackened bulb of a thermometer being sufficient to raise the mercury to + 90° Fah.

About the 10th of April the snow begins to thaw decidedly in the sunshine, and myriads of *Podurœ* are seen at such times moving actively in its cavities. Ptarmigan begin to assume their summer plumage towards the end of the month.

From the 1st to the 6th of May, according to the season, water-fowl arrive. The *Colymbus glacialis* and *arcticus*? arrive occasionally earlier, and frequent a piece of water at the efflux of Bear Lake River from the lake, which remains open all the year.

Swans (*Cygnus buccinator* and *americanus*) are among the early arrivals, the larger species coming first. The *Anas acuta*, *A. crecca*, *Clangula histrionica*, and *Oidemia perspicillata* make their appearance within the first eight days. Gulls come about the 9th or 10th. Singing birds, orioles, and swifts arrive about the middle of the month; the latter varying their time of appearance to a week later, if the spring is tardy. Pools of water and swamps must have been thawed long enough to release a sufficiency of winged insects for the support of the swallow tribe, before they show themselves in a district. About the 10th or 12th of the month small streams break up, the mean temperature of the ten preceding days having risen to 37° Fah. Bear Lake River, which is fed from the depths of the lake with warmer water, breaks its bonds at its efflux earlier. Lower down, this river remains fast till the first or second

week of June. Mackenzie River usually opens at Fort Simpson about the 7th of May, and in the more northern quarters in the course of a week later; the boats which follow the flood in its descent taking about that time to go to Fort Good Hope. In 1849 the river broke up on the unprecedentedly late date of the 23d of May.

At this latter date there is bright light at midnight on Great Bear Lake, and the *Fringilla leucophrys* is employed with other songsters in singing at that hour.

Snow-geese arrive about this time, or a week earlier, and are followed in a fortnight by the laughing-geese. Both kinds wing their way northwards in bands of from fifteen to forty individuals, which are passing every few minutes day and night for about three weeks. Many go on without halting; others alight in the marshes to feed on the nascent stems of the early *Cyperaceæ*, which are developed with marvellous rapidity after the commencement of the thaw, and, though still wrapped in the dead leaves of last season, have acquired juiciness and a sweet taste by the time that the snow has mostly gone. Towards the end of May, or in the first week in June, according to the earliness of the spring, *Chrysosplenium alternifolium*, *Arbutus alpinus*, *Eriophorum vaginatum* begin to flower, and the *Betula glandulosa* and some willows show their tender foliage and catkins. Early in June the *Potentilla fruticosa*, the *Rhododendron lapponicum*, and several anemones flower. Frogs at this time croak loudly; and by the middle of the month, summer may be considered as fairly established. About the 24th or 26th of July, ripe bleaberries (*Vaccinium uliginosum*) may be gathered. Strawberries are generally a week earlier, and the *Arbutus alpina* and *Rubus chamæmorus*, or cloudberry, are somewhat later.

In the beginning of August stars may be seen at midnight; and in the last week of this month the van flocks of snow-geese are seen going southwards, having spent between eighty and ninety days at their breeding stations. The laughing-geese follow in a day or two; but they pass on in autumn without any of the delays that characterise their spring flights, which are necessarily checked as often as a few cold days arrest the melting of the snow on the sea-coast. Drift ice obstructs the navigation of the lake in some seasons till the first or second week of August.

In the last week of August, or in the beginning of September, snow

falls, and by the 10th of the month the deciduous leaves begin to drop. By the 18th, most of the birds which breed in the district have migrated southwards, a few water-fowl and the winter residents alone remaining. Between the first appearance of vegetation, till the falling of the leaves of deciduous trees, about a hundred days elapse; but although this may be taken as the length of the season for the growth of plants, some of the grasses continue to ripen their seeds till the beginning of October, notwithstanding much severe frost before that date. In ordinary seasons the frost sets in severely before the end of September, and the seeds of carices and grasses, instead of dropping off, are frozen hard in their glumes, and remain hanging on the culm till next spring, when they drop off into a soil prepared by the thaw for their reception. It is on these grass seeds of the preceding year that the graminivorous birds feed on their first arrival from the south. In October, when the soil begins to freeze again, the summer thaw has penetrated about twenty-one inches in the neighbourhood of Fort Franklin. The small lakes are covered with ice by the 10th or 12th of the month; and, when that occurs, the last of the water-fowl depart. By the 20th of the month the smaller trees are frozen through, the larger ones remaining soft and moist in the centre. By the end of the month, or early in November, the young ice, filling the bays, puts an end to the navigation of the lake, after it has continued open about sixty days. The centre of the lake does not freeze over till late in December.

TABLE XII.

THERMOMETRICAL OBSERVATIONS IN THE ARCTIC SEAS.

Periods.	Melville Island. Latitude 74¼° N. September, 1819 to August, 1820. (1.)	Port Bowen. Latitude 74¼° N. September, 1824 to August, 1825. (2.)	Igloolik. Latitude 69⅓° N. August, 1855 to July, 1823. (3.)	Winter Island. Latitude 61¼° N. August, 1821 to June, 1822. (4.)	Wolstenholme Sound. Latitude 76½° N. Six times daily. August, 1849 to July, 1850. (5.)
September	+22.66	+25.90	+25.10	+31.62	+26.76
October	-3.02	+10.84	+13.72	+13.15	+11.32
November	-20.85	-5.00	-18.66	+7.80	-18.60
December	-21.80	-19.05	-28.25	-14.24	-27.05
January	-30.64	-28.91	-16.13	-23.13	-25.07
February	-32.31	-27.31	-19.58	-24.01	-34.02
March	-18.10	-28.36	-19.01	-10.78	-17.47
April	-8.30	-6.50	-0.85	+6.50	-3.74
May	+16.74	+17.62	+25.14	+23.31	+25.82
June	+36.22	+36.12	+32.16	+33.16	+39.73
July	+42.43	+38.87	+38.58	+35.33	+40.52
August	+32.63	+35.77	+33.88	+36.88	+33.67
Year	+1.43	+4.33	+5.76	+9.80	+4.54
Spring	-3.13	-5.74	+1.79	+6.35	+1.59
Autumn	-0.43	+10.58	+6.80	+17.53	+6.55
Summer	+37.09	+36.93	+35.07	+35.15	+37.97
Winter	-28.36	-25.02	-21.38	-20.35	-28.53
Difference					

of hottest and coldest months	74.74	67.78	66.83	60.89	74.54
Difference of summer and winter	65.45	61.95	56.45	55.50	66.50

SPITZBERGEN.

	June.	July.	August.	Sum. Quarter.
Hecla Cove, lat. 80° N.	+35.86	+40.17	+38.40	+38.15
Trent cruizing, m. Latitude 80° N., Longitude 10° E.	33.73	35.98	33.80	34.52

Columns 1, 2, 3, and 4. are extracted from a paper which I published in the Ed. Phil. Journ. for 1841. Column 5. is an abstract of a thermometrical register kept by James Rae, Esq., surgeon of the Royal Navy, on board the North Star. An observation was made every four hours.

The preceding pages contain the temperatures of the districts through which the Expedition travelled, wherever I have been able to ascertain them, and also data for extending the lines of mean annual heat (*isothermal*), mean summer heat (*isothæral*), and mean winter heat (*isocheimenal*) across the continent. By comparing the sea-coast temperatures in Table II. and those of the shores of the great lakes in Table I. with those of places in France and Italy lying between the same parallels of 42°-45° north latitude, we perceive that the mean annual heat of Europe is from 8° to 15° Fah. greater than that of America at the same distance from the equator, while the summer heats differ only from 2° to 6°.[85] The inferior mean heat of America is therefore due principally to excessive winter colds, and this is decidedly the case in the interior. As the summer heats, however, regulate the culture of the *cerealia* and the growth of deciduous plants generally, the severe winters of America do

not cause a scanty vegetation. From the 50th parallel northwards the trees are frozen to their centres in winter; and, consequently, the development of buds and other vital processes which go on in the temperate climate of England, even in the coldest months, are completely arrested. This hybernation of plants increases in length with the severity and duration of winter which, generally speaking, augment in the interior of America with the latitude. The summer heats do not, however, decrease in the same ratio as we go to the north; on the contrary, the isothæral lines nearly follow the canoe route, and run to the northward and westward. The elevation of the prairie slopes has less influence in depressing the summer heat, than the nature of the soil and other causes have in raising it.

Experiments are still wanting whereby we may ascertain the ratio of the decrease of mean heat in America with the increase of altitude. In Table II. we find that, notwithstanding the elevation of Franklin Malone above Eastport of 645 feet, its mean temperature is greater; its interior position giving it an advantage in summer heat over the sea-coast, which its greater altitude does not destroy. If we refer to Dove's table, and contrast the temperatures of Mont Louis, which lies near the 43d parallel, with those of low country situations enumerated at the foot of the preceding page, we find a mean difference of temperature of one degree of Fahrenheit for 350 feet of altitude. A similar allowance for the elevation of the successive steps of the St. Lawrence basin would place in still greater prominence the rise of the isothermal lines, and more still that of the isothæral ones, as they recede from the Atlantic coast. There is, however, this difference in the climate of the summit of a mountain and of an elevated plateau, that in the former case we approach near the line of invariable temperature, and the summer heat therefore differs less from the mean of the year, and more from that of the plains, than on a plateau where the depression of mean temperature produced by elevation is due chiefly to winter colds, and in a small degree only to defect of summer heat.

From Table II. also we may learn that the mean temperature of the coast districts of the Pacific is greater than that of the Atlantic countries, and, at the same time, more equable; the difference between the hot and cold months being less. We find in it an expression of the general fact, that the west coasts of continents are warmer than the east ones; and as

Montreal and Fort Vancouver lie nearly in the same latitudes and at the same altitudes above the sea, and both are far enough removed from the coast to be beyond the direct influence of the sea breezes, columns 4. and 6. furnish the means of eliciting many of the peculiarities of climate on the two sides of the continent. Instead of four or five months of continuous snow and ice which Canada may be said to enjoy, for it is the season of general enjoyment, Oregon has an open, rainy winter, with little frost or snow; but, at the same time, a summer of less power.

Table V. exhibits even greater differences in the Pacific and Atlantic climates in a higher parallel. The course of the ocean currents, and the interposition of the peninsula of Alaska and its prolongation by the Aleutian chain of islands, protect the west coast of America from the masses of drift ice which in the same latitudes encumber and chill the Labrador coast for most of the year. Even in the polar regions the west coasts have milder climates. Table X. shows, as far as it goes, that the mean temperature of the west coast of Greenland exceeds that of places on the continent, up to the 150th meridian, though the summer on the coast is greatly colder than that of the interior. By the study of Table XII. we learn that in the polar seas the summer heats vary little, as we might expect from the constant presence of ice; but the annual mean seems to decrease generally with the latitude, the only exception being that of Wolstenholme Sound, in which we have a confirmation of the greater mildness of the west Greenland coast. In the high latitudes the mean heat of the three winter months does not differ greatly in different years; but in some seasons one of these months, in others another, is the coldest, the temperature being ruled greatly by the prevailing winds.

Generally speaking, the mean annual temperature of places in the interior of North America falls within a degree or two of the mean heat of the two months of April and October. The mean temperature of the whole surface of the earth is, according to Dove's calculations, 58.2° Fah., being 54° in January and 62° in July. For such a mean annual heat in America we must descend to the 34th parallel of latitude; but the July heat of 62° Fah., extends northwards to the Mackenzie.

The intense winter colds in the high latitudes are apparently in a great measure owing to the active nocturnal radiation into the clear blue sky. The observatory, which was a small log building without a fire-place, furnished us with the means of judging how much greater the depression

of temperature in the night was in places exposed to the sky, than in those covered in.

The daily curve of atmospheric temperature for the three winter months was a bold and nearly regular hyperbolic curve, of which the mean was -25.2° Fah., the maximum -22.2° Fah., and the minimum -26.7° Fah.[86] The maximum occurs at 1h. 18m. P.M., and the mean line is crossed by the curve at 9h. 19m. A.M., and 6h. 28m. P.M.; the lowest temperature being reached at 7 A.M. The ascending branch of the curve, therefore, corresponds to an interval of 6h. 18m., and the descending one to 17h. 42m. During 14h. 51m. the temperature is below the mean, and it is only 9h. 9m. above it, which indicates a tolerably bold curve in the day, and a nearly horizontal course in the night.

In the observatory the mean for the same period was only -15.91° Fah., and the range no more than 0.97°. The maximum occurred at 6 P.M., being retarded 4¾ hours; and the minimum at 10 A.M., being delayed 3 hours. For most of the night the temperature was above the mean,—such being the effect of the interposition of the building between the thermometer and the blue atmosphere. The walls of the observatory, it is necessary to remark, were by no means air-tight, and the door was opened at least once an hour in the day, and sometimes, especially on term days, much oftener. There was, consequently, a considerable and frequent admission of the external air; and, on the other hand, during the experiments on magnetic intensity, the heat of the observer's body had an evident effect in raising the temperature of the room.

I had intended to have instituted a series of observations, with Sir John Herschell's actinometer, on the nocturnal radiation, and also on the momentary intensity of the direct rays of the sun; but the instrument was unfortunately broken on the voyage. The Edinburgh New Philosophical Journal for 1841 contains the results of observations made at Fort Franklin, with the black bulb thermometer, on the heating power of the sun's rays, and I renewed these observations at Fort Confidence; but, as they were not carried on later than April, they furnish no information respecting the power of the sun in the months in which the processes of vegetation are active. As the black bulb thermometer indicates the accumulative effect of the sun's rays, it seems to be an useful instrument for ascertaining the heating power of the sun on the stems and larger branches of trees, at least, if not also on their leaves and on herbaceous

plants. The hybernation of trees ceases long before the temperature of the atmosphere is sufficient to restore activity to the vegetative processes, and before the earth, still enveloped in its snowy covering, has felt the influence of returning spring. This is evidently mainly or wholly due to the sun's light direct or reflected; and perhaps its rays as reflected from the pure and glassy surface of the snow, after the days have increased considerably in length, may have the same powerful effect on the forest that, according to Professor Forbes, they have on the black-bulb thermometer. For some time after the trees have begun to thaw by day, they freeze again in the night; and in more southern localities, where the sugar-maple grows, the sugar makers are well acquainted with the fact that a hard frost arrests the flow of the sap in the night. Should a hot day, however, follow such an occurrence, the flow is more abundant than ever, the short rest seemingly increasing the irritability of the organs by which the sap is eliminated and circulated.[87]

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[85] Dove's table in the Report of the Brit. Association for 1847 has furnished the means of making this comparison. The places compared were Alais, Arles, Bourdeaux, Dax, Manosque, Marseilles, Montpellier, Pau, Puy, Tarascon, Toulon, Toulouse, Perpignan, Alba, Bologna, Cascina, and Lucca. Oleron of Bearn has the same altitude with Lake Superior, and Mount Louis is 4,900 feet high. All of them lie within the parallels of 43°-45° except the last, which is in 42° 50′ N. The maps of isothermal lines of this author express the general results of the study of the table referred to.

[86] The correction for the error of the thermometer at low temperatures used in Tab. X. col. 8. was not applied to these numbers.

[87] As I was revising this sheet, Sir William Hooker favoured me with an extract from the journal of Mr. Berthold Seeman, botanist of the Herald, part of which follows:—"During our stay at Port Clarence,

in September, 1850, I made several experiments to ascertain the depth to which the thaw penetrated the soil: the result varied; in some places it did not descend above two feet into the earth, while in sandy places the ground was free from frost to the depth of four or five feet. The season was much colder than in 1849, the sea more loaded with ice, and the terrestrial vegetation less vigorous."

No. III.

ON THE GEOGRAPHICAL DISTRIBUTION OF PLANTS IN THE COUNTRY NORTH OF THE 49TH PARALLEL OF LATITUDE.

Generic and Specific Forms of Plants' Decrease in Number as the Latitude increases.—Analogy between Altitude and Increase of Latitude.—Culture of the Vine.—Of the *Cerealia*.—Maize.—Wheat.—Oats.—Barley.—Potatoes.—Botanical Districts.—Their Physiognomy.—Woodland District.—Barren Grounds.—Prairies.—Rocky Mountains.—Sitka.—Polar Plants.—Arctic Zone.—Trees and Shrubs.—Table of Distribution of Species in three several Zones.—Carices.

Though the *isothæral* lines, when the term is restricted to the mean temperatures of the three summer months of June, July, and August, run from Lake Superior northwards to the Mackenzie, yet the short duration of the summer on the banks of that river, and the occasional frosts in June and August, and in some years even in July, render the climate unsuitable for numbers of vegetables which flourish in the northern districts of the United States. Many trees, shrubs, and perennial roots can be frozen without injury if the frost be continuous throughout the winter; and they acquire so much irritability in their hybernation, that the stimulus of perpetual though less fervid day within the arctic circle causes them to perform the functions of foliation and fructification with a rapidity unknown in more temperate regions. Other plants which need longer time to perfect their fruit or woody fibre, terminate in succession according to their several constitutions as the latitude increases. Their place is only partially supplied by other species, which have in like manner their equatorial and polar limits. These are not, however, so numerous as those which die out, there being no rule more general than the decrease of generic and specific forms in passing from temperate zones to arctic or polar ones.

There is a similarity in many respects between the vegetation of

alpine tracts and that of high latitudes, but not an identity, the condition of the two regions differing in some essential particulars. No more apt illustration of this fact is needed than that adduced by Meyen, of Titicaca. This alpine lake, situated on the plateau of Chuquito in southern Peru, at the elevation of 12,700 feet, is surrounded by a rich and beautiful vegetation, which flourishes under a perpetual spring. On its banks a populous community, inhabiting magnificent cities, is supported by a fertile soil, yet trees are wanting in the country; whereas we have seen that the pine forest extends in North America to the 69th parallel beyond the limits of the *cerealia*. On the shores of Lake Titicaca barley and oats grow, but wheat does not succeed, and maize is raised only by artificial heat. In respect of these products, therefore, its climate agrees with that of Fort Simpson on the 62nd parallel. Its summer heat, which, according to Meyen, ranges between 52° and 66° Fah., is more equable than that of Fort Simpson which has a mean daily summer temperature of about 59° Fah., with a mean at noon of 70° Fah.; and a range of from 90° Fah. down to below the freezing point.

It is necessary to remark, however, that the decrease of vegetable forms with an increase of latitude has more analogy to that which is observed on a lofty isolated mountain than on an elevated plateau; and plants actually grow on the summits of the White Mountains of New Hampshire which are not met with again until we reach the shores of the Arctic Sea.

The peculiarities of the climate of Canada and Rupert's Land may be in part shown by reference to a few of the plants usually cultivated for food. The *vine* would thrive with the summer heat of Fort Simpson were the season long enough; but the September and October heats, which are required to ripen its fruit, do not occur in any district of Rupert's Land; and the grape is destroyed by the severe night frosts which are frequent in autumn even in so low a parallel as the north shore of Lake Superior. The conditions essential to the due growth of the vine, mentioned by Meyen[88], do not extend in the basin of the St. Lawrence beyond the 43rd parallel, while on the Rhine wine is a profitable production up to the 51st.

Maize is a plant which thrives best in the dampest and hottest tropical climates, where it brings forth eight hundred-fold. Its culture extends into temperate regions, but with a greatly diminished yield; and it

is cultivated near its northern limit only as a green vegetable, the grain seldom ripening, and being eaten in its milky state. This is its condition in most parts of Great Britain, when reared in the open field. On the western shore of Europe it is not cultivated beyond 46°, though in the valley of the Rhine it extends to 49° north lat. In South America, on the Chili coast, it is planted as low as 40° south lat.; and on the Peruvian plateau, at the height of 12,000 feet, above which it requires artificial shelter and warmth. A profitable return can be obtained from it in Rupert's Land between the 49th and 51st parallels, where, however, the vine does not accompany it as on the banks of the Rhine. Garden cultivation and shelter from spring frosts would extend its cultivation in Rupert's Land even higher than in England. On the fertile acclivity of Young Street which leads from Toronto to Lake Simcoe, and crosses the 44th parallel of latitude, we may behold heavy crops of maize, and cucumbers and gourds, ripening, in the same field, with but little expenditure of care or labour, though the mean annual heat, being 41° Fah., is inferior to that of the Orkney and Shetland Islands, where barley, one of the most northern of the cereals, grows imperfectly. The summer heat of Young Street, however, exceeds that of any part of the British Isles.

Wheat is the cereal which requires most heat of those usually cultivated in England. Its culture is said to ascend to 62° or 64° north lat. on the west side of the Scandinavian peninsula, but not to be of importance beyond the 60th. On the route of the Expedition it is raised with profit at Fort Liard in lat. 60° 5′ north, long. 122° 31′ west, and having an altitude of between 400 and 500 feet above the sea. This locality, however, being in the vicinity of the Rocky Mountains, is subject to summer frosts; and the grain does not ripen perfectly every year, though in favourable seasons it gives a good return. At Dunvegan, on Peace River, lying in lat. 56° 6′ north, long. 117° 45′ west, and at an altitude of 778 feet, the culture of this grain is said to be equally precarious. It grows, however, freely on the banks of the Saskatchewan, except near Hudson's Bay, where the summer temperature is too low. From Mr. M'Pherson I learnt, that on the west side of the Rocky Mountains good crops of wheat are raised with facility at Alexandria, on Frazer's River, in lat. 52° 30′ north, long. 122° 40′ west, and 300 or 400 feet above the sea; also at Fort George, on the same river, more than a

degree further north, and 100 feet higher.

At Fort James, on the borders of Stuart's Lake, in lat. 54½° north, in a mountainous region near the source of Frazer's River, wheat continues to grow, but often suffers from the summer frosts. In these quarters the grain comes to maturity in about four months. In the colony of Red River its growth is luxuriant, though the upper part of that country, which touches the 49th parallel of latitude, is elevated about 1,000 feet above the sea. Periodical ravages of grasshoppers, however, frequently destroy the hopes of the husbandman.

At Fort Francis, situated on the banks of Rainy River in lat. 48° 36′ north, long. 93° 28½′ west, wheat is generally sown about the 1st of May, and is reaped in the latter end of August, after an interval of about 120 days. In 1847 multitudes of caterpillars spread like locusts over the neighbourhood. They travelled in a straight line, crawling over houses, across rivers, and into large fires kindled to arrest them. Throughout the whole length of Rainy River, on the Lake of the Woods, and on the River Winipeg, they stripped the leaves from the trees, and ate up the herbage. They destroyed the *folle avoine* on Rainy Lake, but left untouched some wheat that was just coming into ear. This was the first time that Fort Francis had experienced such a visitation. When we passed that way in 1848, the still leafless trees were covered with the coccoons of last year, in each of which there remained the hairy skin of a caterpillar.

On the island of Sitka, lying in 57°-58° north latitudes, though the forest, nourished by a comparatively high mean temperature and a very moist atmosphere, is equal to that of the richest woodlands of the northern United States, yet corn does not grow.

In the middle temperate zone of France wheat is cultivated to the height of 5,400 feet only. In Mexico its culture commences at the altitude of 2,500 or 3,000 feet, and ascends to more than 9,000 feet. On the plateau of southern Peru, 8,000 feet above the sea, its yield is extraordinary; and on the foot of the volcano of Arequipa it succeeds as high as 10,000; but it will not grow in the equable temperature of Lake Titicaca, the heat there not being sufficient to ripen either it or rye. It requires for its growth, says Meyen, the mean annual heat of 39° Fah., combined with a summer heat of 56° Fah.: a much inferior mean heat is, however, sufficient in the extreme climate of subarctic America, provided the summer heat for 100 or 120 days be great enough.

Oats are little cultivated in Rupert's Land; they require longer time than barley to ripen, and are therefore not likely to grow so far north. They have not been tried at Fort Norman, however, which is the most advanced post in that direction where barley is cultivated. Mr. M'Pherson finding some grains of oats accidentally in a barley field, propagated them, and raised some good crops on the River of the Mountains, and I believe also at Fort Simpson. On the Scandinavian peninsula this grain is said to extend to 62½° N. and 65° N., but, even on the latter parallel, falling five degrees short of the latitude which barley reaches. Meyen saw ripe oats at Lake Titicaca.

In good seasons *barley* ripens well at Fort Norman on the 65th parallel, as has been mentioned in the narrative (l. p. 165.). All Mr. Bell's attempts to raise it at Fort Good Hope, two degrees further north, failed. It reaches, as we have just observed, the 70th degree of latitude on the Scandinavian peninsula, and it is cultivated for green fodder in Peru up to the height of 13,800 feet, but seldom ripens its grain higher than 10,000 feet. (Meyen.)

Potatoes, which have been cultivated from time immemorial on the banks of Lake Titicaca, yield abundantly at Fort Liard, and grow, though inferior in quality, at Fort Simpson and Fort Norman. They have not succeeded at Fort Good Hope, near the 67th parallel. At the latter place *turnips* in favourable seasons attained a weight of from two to three pounds, and were generally sown in the last week of May. At Peel's River the trials made to grow culinary vegetables had no success. Nothing grew except a few cresses. Turnips and cabbages came up about an inch above the ground, but withered in the sun, and were blighted by early August frosts.

In the preceding narrative, as well as in the geographical sketch, we have had frequent occasion to allude to several great divisions of North America, each of which has a peculiar physiognomical character in its vegetation.

1st. The eastern woodland country constitutes the first division, in which the forest extends from the Atlantic westward till it meets the great prairies.

2nd. The second division lies to the north of the forest lands, and is appropriately named the "Barren Grounds." This tract has its greatest north and south extension on the eastern coast. On the shores of

Hudson's Bay and the Welcome it reaches from the 60th or 61st parallel to the extremity of the continent, but narrows to the westward; since the boundary line of the woods takes a diagonal or north-east direction from the 91st meridian, and, before reaching the 120th, has risen to the 67th parallel. Further to the west the Barrens Ground form a border to the Arctic Sea of greater or less breadth according to the northerly prolongation of the continental promontories, since the southern limit is nearly coincident throughout with the arctic circle, on which it approaches Beering's Straits—clumps of spruce fir[89], the usual outliers of the forest, having been observed on Buckland or Noatak River which falls into Eschscholtz Bay. The fertile alluvial deposits of the well-sheltered valley of the Mackenzie interrupt the continental continuity of the Barren Grounds by carrying the woods nearly to the sea shore; but there seems to be no other material indentation of the barren district; and even on the Mackenzie the valley is bridged, as it were, by the naked summits of the alpine ridges.

3rd. The prairie slope forms a third physiognomical district of vegetation, which has the greatest transverse expansion on the Missouri, and, narrowing as it goes north, runs out on the 60th parallel, having, after passing the Saskatchewan, been much indented by the woods which feather the numerous rivers that drain the declivity. These prairies have much analogy with chalk downs in aspect as well as in mineral constitution.

4th. The Rocky Mountain chain, and the alpine ranges and isolated peaks which rise to the westward of it, may be considered as a fourth district which nourishes some peculiar species of plants.

5th. And the lower woodland country on the Pacific side of the range forms a fifth.

If we trace any one of these districts northwards, making due allowance for the varying altitude of the country above the sea, we may ascertain the effect of increase of latitude on the vegetation of that meridian; but, if we compare one district with another, we must keep in view the climatological fact of the rise of the isothermal lines in proceeding westward. The course of the forest boundary is one illustration of this phenomenon; and we have another in the range of certain species or forms constituting that forest. Thus the *Cupressus thyoides* is rare beyond the 49th parallel in the eastern district, and

terminates altogether along with the *Thuya occidentalis* on the 53rd, while the magnificent *Cupressus* or *Thuya nutkatensis* adorns the forests of Norfolk Sound on the 58th parallel of the Pacific coast. The distribution of the *Pinus inops*, *Abies canadensis*, *Rubus nutkanus*, and of some other conspicuous trees and shrubs, show that the vegetation of the district of Sitka on the north-west coast is equal and similar to that of the eastern states of Wisconsin or Minesota eight decrees further south.

The physiognomy of the *woodland district* through which the canoe route lies has been incidentally touched upon in the descriptions of several localities that have been introduced into the narrative, yet it will not be out of place to recall its general features here. Of this district, which has a breadth of about 600 geographical miles between the 50th and 55th parallels, the white spruce is the most abundant and characteristic tree; yet up to the 54th parallel it is conjoined, and especially on the banks of rivers, with other trees which break the monotony of the dark evergreen forest. Beyond the banks of the Saskatchewan the oaks, elms, ashes, maples, bass-wood, white thorns, Virginian clematis, and various other trees and shrubs cease to grow; and the white spruce may be said to cover the face of the country, except on the alluvial borders of rivers and lakes, where the aspen, balsam poplar, balsam fir, alder, and multitudes of willows usurp its place, or on the edges of swamps where the black spruce leads a lingering, unhealthy existence. With the black spruce the larch is often associated; though it is not confined to morasses, yet it is too much isolated in its distribution to produce a difference of tint sufficiently massive to please the eye, except in a very few localities. The Banksian pine is more frequently seen in considerable patches, and its appearance is agreeable to the voyager; for, independent of the fact that its spreading branches and general form, resembling that of the Scotch fir, is a rest to the eye wearied with the tapering stiffness of the spruce, it offers the prospect of a dry and comfortable encampment. It always grows in a sandy soil, and is remarkable among the Rupert's Land trees for its freedom from underwood. Not so the white spruce, which admits of a thick undergrowth of willows, cornel bushes, viburnum, roses, brambles, and gooseberries; and, in the country south of Lake Winipeg, of maples, American yews, and many other shrubs and trees. The willows, especially when conjoined with the falling or inclined stems of forest trees

—the growth of bygone centuries, form a barrier to the progress of a white man in the forest; but the slim and agile native glides through the tangled thicket with a noiseless and ghost-like ease, impassive to the annoyance of the moscheto clouds that darken the air. The prickly twining *Panax horridum*, which interlaces and arms the brushwood on the north-west coast up to the 58th parallel, has no representative on the east side of the continent, except perhaps the *Aralia hispida*, which, though of the same family, has feeble defences, and is not a climber. The *Cratægi* have the most offensive weapons of any of the shrubs in Rupert's Land.

Even beyond the Saskatchewan, where the maples, ampelopsis, and some other trees and shrubs whose leaves assume the orange and red tints before they fall, cease to grow, the river banks are enlivened by the bright purplish shoots of the white cornel berry (*osier rouge*) and the gay spires of the *Epilobium angustifolium*, which rise above a man's height in the alluvial deposits, and are varied also by other shrubs that have been noticed in the descriptions interspersed through the preceding pages. These are merely the foreground incidents, however; the sombre spruce everywhere forms the back ground.

The agency of man is working a change in the aspect of the forest even in the thinly peopled north. The woods are wasted by extensive fires, kindled accidentally or intentionally, which spread with rapidity over a wide extent of country, and continue to burn until they are extinguished by heavy rains. These conflagrations consume even the soil of the drier tracts; and the bare and whitened rocks testify for centuries to the havoc that has been made. A new growth of timber, however, sooner or later springs up; and the soil, when not wholly consumed, being generally saturated with alkali, gives birth to a thicket of aspens instead of the aboriginal spruce.

The frozen subsoil of the northern portions of the woodland country does not prevent the timber from attaining a good size, for the roots of the white spruce spread over the icy substratum as they would over smooth rock. As may be expected, however, the growth of trees is slow in the high latitudes. On the borders of Great Bear Lake, four hundred years are required to bring the stem of the white spruce to the thickness of a man's waist. When the tree is exposed to high winds, the fibres of the wood are spirally twisted; but in sheltered places, or in the midst of

the forest, the grain is straight, and the wood splits freely.

At the limit of the woods the white spruce is everywhere the most advanced tree, growing either solitarily, with its branches clinging to the ground and its dwarfed top bent from the blast, or in small clumps in some favourable locality. The *Salix speciosa* may indeed be said to pass beyond the spruce; but it does so only on the alluvial points of rivers, and not in its tree form.

Though the species of plants become less numerous as we advance northwards through the woody region, there is no falling off in the number of individuals of the species that remain. For not only is the forest crowded, and often almost impenetrably so, when the trees are young, but on the margins of rivers, and other open places, there is a dense herbaceous vegetation, which clothes the ground in Rupert's Land as perfectly as it is covered in a lower latitude, though the vegetation be less rank. On the inundated alluvial flats tall carices grow as closely as they can stand, and furnish an abundance of nutritious hay. There is, however, a total absence in the north of the *Lianas*, *Tillandsiæ*, and parasitic *Orchideæ*, which impart so peculiar an aspect to the forests in some of the warmer districts of the earth. The great hedge bindweed, (*Calystegia*,) the Virginia creeper, the hop plant, and the twining herbaceous *Smilacina*, with its grape-like clusters of blackberries, disappear on the south side of Lake Winipeg, and the only aerial parasite in the north is the leafless *Arceuthobium oxycedri*, which seats itself on the branches of the Banksian pine. The graceful *Usneæ* which hang from the branches of the ancient black spruces in long, thread-like hanks, have, it is true, some resemblance to the *Tillandsiæ* which forms an elegant drapery to the ever-green oaks of Georgia and Florida.

In the eastern woodland district, from the St. Lawrence to the Saskatchewan, the *Compositæ* are the most numerous family of plants, and they form between the sixth and seventh of the whole phænogamous vegetation. Next to them come the *Cyperaceæ*, which, owing to the great development of the genus *Carex*, constitute more than one-ninth of the *Phanerogamia* of the district.

In the *second*, or *barren ground district*, in places where the soil is formed of the coarse sandy *débris* of granite, and is moderately dry, the surface is covered by a dense carpet of the *Cornicularіæ tristis*, *divergens*, *ochroleuca*, and *pubescens*, mixed in damper spots with

Cetrariæ cucullata and *islandica*. In more tenacious soils other plants flourish; not, however, to the exclusion of lichens, except in tracts of meadow ground. The *Rhododendron lapponicum*, *Kalmia glauca*, *Vaccinium uliginosum*, *Empetrum nigrum*, *Ledum palustre*, *Arbutus uva ursi*, *Andromeda tetragona*, and several depressed or creeping willows, lie close to the soil, their stems short, twisted, and concealed, with only the summits of the branches showing among mosses or lichens. Here and there, on the moister sides of the hills, there is a gay display of saxifrages, pediculares, or primroses; and a few of the sandy spots on the coast are enlivened by a beautiful dwarf phlox or a handsome dodecatheon. On the alluvial banks of rivers only are willows of erect growth to be found, and of these the *Salix speciosa* is the most robust and the handsomest. On the sandy shore of the sea the *Pisum* (or *Lathyrus*) *maritimum*, the *Polemonium cæruleum*, various blue and yellow *Astragali*, and several *Artemisiæ* flourish. Most of these plants also occur, though more sparingly, in the interior. One circumstance which came under my observation, and has been cursorily alluded to in the Narrative (I. p. 322.), is the existence of very ancient stumps of trees, either solitary or grouped, in various places of the barren grounds, seemingly the vestiges of the forest, which had spread more widely over the country some centuries ago than in the present day. Further evidence that such was the case may be obtained in the extension of *Pyrolæ*, and some other woodland plants, to the coasts of the Arctic Sea. On the sheltered banks of rivers, even in the barren grounds, clumps of living trees occasionally occur; but the stumps I speak of stand often on the exposed side of a hill, and indicate a deterioration of climate, however that may have been produced. We saw no young firs growing up in such situations to leave similar vestiges in a future age.

In many sheltered valleys on the sea-coast, and even in the more elevated interior, especially where a fertile soil has been formed by the decomposition of trap rocks, there is a good growth of grasses, several of which flourish well on lands that are occasionally inundated by the sea. Among these are *Elymus mollis*, *Spartina cynosuroides*, *Calamagrostis stricta*, *Carices stans*, *compacta*, *glareosa*, *membranacea*, and *livida*, *Colpodium*, *Deschampsia*, *Festuca*, and several *Poæ*. In some of the maritime meadows to which the reindeer resort to bring forth their young, there are treacherous mud-banks, which

are soft enough and deep enough to swallow up a deer or musk ox, that may rush heedlessly into them when chased by a wolf; but in general the frozen subsoil is so near the surface as to preclude any such accident. The existence of these boggy places, which were seen only on the sea-coast, scarcely affords a satisfactory solution to the problem of the entombment of a living elephant or rhinoceros, and the subsequent preservation of the entire carcass in the frozen soil. But in whatever manner this may have taken place, I should infer, from the economy of the arctic regions, that these animals were migratory, like the reindeer of the present day, and wintered in milder climates.

On approaching the arctic circle the relative proportion of the *Compositæ* greatly decreases, and that of the *Cyperaceæ* increases within the woody tracts, though it falls off on the barren grounds. Taking the whole zone between the arctic circle and the extremity of the continent, which includes much woodland, the *Cyperaceæ* are the most numerous family of plants, and are more than double the *Gramineæ*. The *Cruciferæ* come next to the *Cyperaceæ* in this zone. In the polar regions beyond the continent, the *Cruciferæ* take the first place in respect of number of species, then come the *Gramineæ*, which are closely followed by the *Saxifrageæ*.

The *third*, or *prairie district*, has the prevailing aspect of a grassy plain, the herbage, however, having a considerable intermixture of carices among the true grasses. The herbage grows up rather wiry in the dry summers of that region; but, in consequence of the fires that frequently spread over vast tracts, a young growth takes place, to which the bison and deer resort. On the Arkansas, the "buffalo or bison grass" is the *Sesleria dactyloides*. Whether this species extends to the Saskatchewan or not, I am unable to say: we certainly did not gather it there; but at the time that Mr. Drummond and I visited that part of the prairie, recent fires had made flowering specimens of grasses very rare. Of the phænogamous prairie plants actually collected, the *Gramineæ* form about the eleventh, and the *Cyperaceæ* the sixteenth. On the plains the *Compositæ* are numerous and showy; there is a considerable variety of handsome *Leguminosæ*, with some pretty *Borragineæ*; and the *Artemisiæ*, owing to the quantity of surface they cover, though the species are not numerous, contribute greatly to the hoary aspect of the prairie vegetation. The *Rosaceæ* vie with the *Cyperaceæ* in number of

species; but many of them are fruit-bearing shrubs, growing on the banks of the rivers that serpentine among alluvial points, in channels sunk deeply below the general surface of the prairie.

Between the 32nd and 33rd parallels, on the Gila and Rio del Norte, west of the Rocky Mountain ridge, Colonel Emory gathered many examples of *Cacti*, of which Dr. Engelman has described fifteen species belonging to the genera *Mammillaria*, *Echinocactus*, *Opuntia*, and *Cereus*. Among these, the *Pitahaya*, or *Cereus giganteus*, is the most remarkable, as it grows in the shape of a candelabra, or Titanic tuning-fork, with three or four prongs, to the height of sixty feet. Cacti are numerous also on the eastern side of the mountains in the same parallel; and the smaller kinds, chiefly *Opuntiæ*, range northwards over the prairies to the 49th parallel, and perhaps still further north. We gathered *Opuntia glomerata*, or the *crapaud verd* of the voyagers, on the Lake of the Woods; and a species of the same section of the genus attains an equally high parallel on the Pacific coast.

With the physiognomy of the vegetation on the Rocky Mountains, and of the district to the west of that range, I have no personal acquaintance, and borrow the following notice of the vegetation of Sitka from Bongard. Sitka is situated in the entrance of Norfolk Sound, on the 57th parallel, near an extinct volcano, named Mount Edgecumbe, which marks the entrance of the sound. The most remarkable mountain in the immediate vicinity of the settlement is Westerwöi, which is 3,000 Parisian feet in height, and is clothed to its summit by a dense forest of pines and spruces, some of which acquire a diameter of seven feet, and the prodigious length of 160 feet. The hollow trunk of one of these trees formed into a canoe, is able to contain thirty men, with all their household effects. The climate of Sitka is very much milder than that of Europe on the same parallel. The cold of winter is neither severe nor of long continuance; but the atmosphere is charged with vapours, whose condensation occasion almost constant rains. In the month of July the sun is seldom visible on more than three or four days, and then only for an instant. This humidity gives astonishing vigour to the vegetation, yet corn does not grow there; and, in fact, the want of level surface is an impediment to cultivation. In six weeks the botanists collected 222 species of plants, of which thirty-five were new to science.

Of the *Polar plants*, amounting to ninety-one species, which inhabit

Melville Island, the shores of Barrow's Straits and Lancaster Sound, and the north coasts of Greenland, between the 73rd and 75th parallels of latitude, about seven-ninths range to Greenland, Lapland or Northern Asia. Of the remainder, some have been gathered on the shores of the Arctic Sea from Baffin's Bay to Beering's Straits; and it is probable that if these high latitudes were fully explored, the flora of the entire zone would be found to be uniform. Some of the more local plants will perhaps be ascertained, on further acquaintance, to be mere varieties altered by peculiarities of climate. That the flora as well as the fauna in the high northern latitudes is nearly alike in the several meridians of Europe, Asia, and America, has long been known. And even when we descend to some distance south of the arctic circle, we find that this law is superior to the intrusion of high mountain chains, and is but partially infringed upon. In taking the St. Lawrence basin for instance, if we allow for the rise of the isothermal lines on the west coast, and make our comparisons in an oblique zone, including Sitka and Wisconsin, we shall find that there is much similarity in the floras on the two sides of the continent. The Rocky Mountain ridge is not by any means a boundary to the peculiar vegetable forms of the Pacific coast; on the contrary, many of them cross the ridge to its eastern declivity, though they do not descend into the low country; and there is actually more similarity between the vegetation of the prairies of Oregon, and those of the Missouri and Saskatchewan, than there is between the latter and the eastern parts of the United States and Canada. In still more southern latitudes the case may be different; and Ehrenberg has found a totally different group of *Infusoria* in California from that which exists on the east side of the continent; the Rocky Mountains, in his opinion, proving a complete barrier to these organisms.

The families of *Polar plants* which are most rich in species are the *Cruciferæ*, *Gramineæ*, *Saxifrageæ*, *Caryophylleæ*, and *Compositæ*. Of these the *Saxifrageæ* are most characteristic of extreme northern vegetation. All of them that inhabit the 74th parallel in America are found also in Spitzbergen, Lapland, or Siberia; and even the polar species are twice as numerous as those which exist in the wide district which Gray's "Flora of the Northern States" comprehends. If we reckon all that enter the arctic circle, we shall find them to be four times as many as those which Dr. Gray enumerates; and we may add that the plant which

Humboldt traced highest on the Andes was a saxifrage. The *Caryophylleæ* and *Cruciferæ*, which vie with the saxifrages in number on the 74th parallel, include many of the doubtful local species above alluded to. Of the most northern *Gramineæ*, about one half are, as far as we yet know, exclusively American; the few species which the other families contain have as extensive a lateral range as the saxifrages.

Arctic zone.—On descending to the main land from the 71st parallel down to the arctic circle, including a zone of four degrees of latitude, we find that the species have increased eight-fold in number, and there is a large addition of generic forms, as might be expected on entering within the limits of the forest.

The Polar families are—

Ranunculaceæ	Compositæ	Polygoneæ
Papaveraceæ	*Cichoraceæ*	Salicaceæ
Cruciferæ	*Eupatoriaceæ*	Junceæ
Caryophylleæ	*Senecionideæ*	Cyperaceæ
Leguminosæ	Campanulaceæ	Gramineæ
Rosaceæ	Ericeæ	Lycopodineæ
Onagrariæ	Polemoniaceæ	Equistaceæ
Saxifrageæ	Scrophularineæ	Cryptogamia

In addition to the above the following enter the *Arctic Circle*:—

Sarracenieæ	Caprifoliaceæ	Chenopodieæ
Fumariaceæ	Valerianeæ	Eleagneæ
Violarieæ	Compositæ	Santalaceæ
Droseraceæ	*Asteroideæ*	Empetreæ
Polygaleæ	Vaccinieæ	Urticeæ
Lineæ	Monotropeæ	Betulaceæ
Balsamineæ	Gentianeæ	Coniferæ
Celastrineæ	Diapensiaceæ	Juncagineæ
Halorageæ	Hydrophylleæ	Aroideæ
Ceratophylleæ	Borragineæ	Naiades
Portulaceæ	Orobancheæ	Smilaceæ
Crassulaceæ	Labiatæ	Melanthaceæ

Grossularieæ	Verbenaceæ	Asphodeleæ
Umbelliferæ	Primulaceæ	Orchideæ
Araliaceæ	Plumbagineæ	Irideæ
Corneæ	Plantagineæ	Filices

I made a pretty full collection of lichens and mosses within the arctic circle; but since so many of them are almost cosmopolites, and a still greater number are common to both the temperate and frigid zones, under similar conditions of moisture and exposure, I have avoided swelling the lists with their names. *Fungi* are not wanting in the northern regions, but the difficulty of preserving them prevented me from gathering many. All the families in the above two lists are represented in England, except *Diapensiaceæ*, which is a Lapland form; and *Sarracenieæ* and *Araliaceæ* which are more purely American.

Between the arctic circle and the south side of the Winipeg or Saskatchewan basin on the 50th parallel, embracing the entire width of the continent, the following families make their appearance:—

Berberideæ	Terebinthaceæ	Euphorbiaceæ
Nymphæaceæ	Cucurbitaceæ	Ulmaceæ
Capparideæ	Loranthaceæ	Cupuliferæ
Cistineæ	Paronychieæ	Myriceæ
Malvaceæ	Jasmineæ	Liliaceæ
Tiliaceæ	Apocyneæ	Alismaceæ
Hypericineæ	Asclepiaceæ	Pontederiaceæ
Acerineæ	Convolvulaceæ	Restiaceæ
Ampelideæ	Solaneæ	Hydrocharideæ
Geraniaceæ	Amaranthaceæ	Marsiliaceæ
Oxalideæ	Aristolochieæ	Salvinaceæ
Rhamneæ		

The families which reach the St. Lawrence basin, but do not extend northwards to the Winipeg valley, or enter the western prolongation of that zone, are—

Menispermaceæ	Hamamelideæ	Saurureæ
Podophylleæ	Compositæ	Juglandaceæ

Limnanthaceæ	*Vernoniaceæ*	Platanaceæ
Oxalideæ	Acanthaceæ	Camelineæ
Rutaceæ	Nyctagineæ	Hypoxideæ
Lythrarieæ	Phytolacceæ	Dioscoreæ
Cacteæ	Laurineæ	

To give a further view of the accession of families in going southwards, the following are added from Dr. Gray's "Botany of the Northern States":—

Magnoliaceæ	Hippocastanaceæ	Nyssaceæ
Anonaceæ	Melastomaceæ	Podostomeæ
Cabombaceæ	Hydrangeæ	Balsamifluæ
Resedaceæ	Aquifoliaceæ	Amaryllidaceæ
Elatinaceæ	Ebenaceæ	Hæmodoraceæ
Anacardiaceæ	Bignoniaceæ	Xyridaceæ

In tracing individual species to their northern limits, we did not discover in any one instance that the crest of a water-shed between successive transverse river basins was a boundary to the plant. Many of the more remarkable trees, oaks, &c. flourish in the neighbourhood of Rainy Lake and on the upper part of Red River, but die out on approaching the south end of Lake Winipeg. Others go a degree or two further north to the banks of the Saskatchewan, about Cumberland House, and there make their last appearance: among these are the ashes, elms, and maples. Some which are not seen beyond that locality on the canoe route, go three or four degrees further north on the western side of the prairies, in the sheltered valleys of the Rocky Mountains. In these valleys also the lamented Drummond found a considerable number of the species of the Pacific coast, their range not being cut short by the dividing ridge, but being seemingly more effectually limited by the dry prairies. It is unfortunate that the vertical limits of the species gathered by Drummond in the mountains were not noted, as a careful list containing that element, and which no one was more able than he to make, would have conveyed much information with respect to the distribution of plants. The statistical enumeration of the mountain species, collected between 52° and 57°, in the subjoined table evidently contains a mixed

flora; some families having an arctic, almost a polar character; others a subarctic, or almost temperate one.

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[88] This author states that the culture of the vine is regulated more by the length of summer than by its high temperature, though the latter is also an element in the proper ripening of the grape. It will succeed, he says, under every tropical heat, provided the atmosphere be not too moist. It thrives well under a mean heat of 60° Fah.; it ripens with a lower mean heat of 48° Fah., and a summer heat of 67° Fah., but the juice contains less sugar and yields less alchohol. (Meyen, Geogr. of Plants.)

[89] The species is doubtful.

LIST OF TREES AND SHRUBS.[90]

RANUNCULACEÆ.—*Clematis virginiana* is common to Oregon, the eastern United States, and Canada, and extends northwards to the Saskatchewan.

BERBERIDEÆ.—*Berberis vulgaris* has been found in Canada, Newfoundland, and New England, and is considered as having been introduced from England. The pinnate-leaved barberries or *Mahoniæ* are natives of Oregon, and perhaps extend northwards into New Caledonia or Vancouver's Island.

CISTINEÆ.—*Hudsonia tomentosa* grows in New Jersey and Canada, on the borders of all the great lakes, and onwards on the canoe route to Clear-water River on the 57th parallel, beyond which it was not observed.

TILIACEÆ.—*Tilia glabra*, the lime tree, white wood, or bass wood, is a familiar ornamental and useful tree in the United States and Canada. We observed it as far north as Lake Winipeg, but only as underwood, sending out long flexible branches, which the natives convert into temporary cordage.

ACERINEÆ.—*Acer montanum* (*vel spicatum*), the mountain maple, has a range from Maine, Pictou, Wisconsin, and Minesota, to the River Winipeg, and, from the beautiful orange and red tints which its leaves assume in decay, is a great ornament to the woods in autumn. *A. circinatum* is confined to the west coast, is common in Oregon, and extends to the British territory on that side of the mountains. It grows in the woody country only, and chiefly in the pine forests, where its pendulous branches, taking root, form almost impenetrable thickets. The close-grained tough wood is used by the natives for making hoops.

A. saccharinum, sugar maple, with the variety, or perhaps species, named *A. nigrum* by Michaux, has been traced by Dr. Asa Gray along the Alleghany Mountains to Georgia. In the low country it scarcely passes to the south of Pennsylvania, but on the west side of the valley of the Mississippi is found as far south as Arkansas. Its northern limit is a short way beyond the 49th parallel on the elevated southern water-shed of Lake Winipeg; but it may, perhaps, attain a greater northern latitude in the lower country of Canada. A little to the south of Rainy Lake it yields abundance of good sugar. The variety named bird's-eye maple grows on

one of the islands of the Lake of the Woods, and has been employed for making gun-stocks. Goat Island, at the Falls of Niagara, according to Mr. David Douglas, nourishes some of the largest sugar maples in North America.

A. rubrum, red or swamp maple, ranges southwards, according to Dr. Gray, to Florida, and round the whole Gulf of Mexico to northern Texas; but some of the southern forms, he says, would probably be considered by European botanists to be specifically distinct from the northern tree. It grows in Nova Scotia, throughout Canada, westward to Lake Winipeg and the Rocky Mountains on the 52nd or 53rd parallel, and also crosses that chain to the head waters of the Columbia.

A. pennsylvanicum, striped maple, or moose wood, comes down along the coast to Boston, and follows the mountains from Pennsylvania to the borders of Georgia, to which Dr. Gray has traced it. It grows also in Kentucky, and was seen by us on the banks of the Winipeg, where it has more the character of a flexible willow than of a tree. *A. macrophyllum* is confined to the mountainous country on the Pacific up to the 50th parallel, and is one of the most graceful trees, rising to the height of ninety feet, with a circumference of sixteen. *A. dasycarpum*, white or silver maple, is a fine large ornamental tree, well known in the United States. It is found on Lake Huron, but does not appear to rise northwards out of the St. Lawrence basin. Good sugar is made from the juice of this tree.

Negundo fraxinifolium or *aceroides*, ash-leaved maple, does not, to Dr. Gray's knowledge, grow wild in New England. It abounds in Pennsylvania, and extends westwards to western Texas and the Rocky Mountains, growing at the high elevation of 6,000 or 7,000 feet near Santa Fé and the Pawnee Fork, according to Lieut. Abert. It terminates northwards about the 54th parallel on the banks of the Saskatchewan, and is the tree which yields most of the sugar made in Rupert's Land. Though this product varies much with the skill of the operator, the kind obtained from the juice of this tree is generally of a darker colour than that which the true sugar maple yields.

AMPELIDEÆ.—*Ampelopsis quinquefolia*, Virginia creeper, or American ivy, extends northwards to Lake Winipeg, and is a great ornament to the protruding rocks over which it creeps. It is a familiar shrub in the Northern States, but I have not been able to ascertain its

southern limit. The *Vitis cordifolia* or *riparia*, frost grape, grows, on the evidence of collections made on my former journeys, as far north as the south end of Lake Winipeg, on the 50th parallel. I did not observe it on my late voyage, in which, indeed, I had very little leisure to search for plants; and if it actually grows in so high a latitude, it does not produce edible fruit so as to attract the attention of the residents, who could give me no information concerning it. Together with the *Vitis æstivalis*, or summer grape, it is common in Wisconsin and Minesota. Some of the native American vines are cultivated in the eastern states; and the Isabella grape, a variety of the *Vitis labrusca*, has an agreeable though peculiar flavour.

Zantholaceæ.—*Zanthoxylum americanum*, northern prickly ash, and *Ptelea trifoliata*, the shrubby trefoil, grow in Canada and Wisconsin, where they seem to find their northern limit.

Celastrineæ.—*Staphylea trifolia*, bladder nut; *Euonymus atropurpureus*, burning bush; *E. americanus*, strawberry bush; and *Celastrus scandens*, inhabit Canada and Wisconsin, but were not observed to the north of Lake Superior. *E. atropurpureus* crosses the continent to Oregon.

Rhamneæ.—*Rhamnus alnifolius*, alder-leaved buckthorn, grows from Maine and Michigan northwards, to about the 58th parallel. It is a low shrub, and is applied to no economical purpose. *R. purshianus* is an Oregon plant, which extends to Vancouver's Island and New Caledonia. *Ceanothus americanus*, New Jersey tea, ranges from Maine, Michigan, and Wisconsin, to Canada West, but was not gathered by us to the north of Lake Superior. The *C. lævigatus*, a west-coast species, which extends from Oregon to Vancouver's Island, seems to be the only member of the genus that enters the British territory. *C. sanguineus* is common in the valley of the Columbia, and crosses the mountains to the upper tributaries of the Missouri, forming one of the many instances of west-coast plants traversing the dividing ridge to the eastern prairies, but not extending to the eastern woodland districts.

Terebinthaceæ, or Anacardiaceæ.—*Rhus radicans* or *toxicodendron*, the poison oak; *R. aromatica*, the fragrant sumach; and *R. glabra*, the smooth sumach, reach the banks of the Saskatchewan, or latitude 45°. *R. typhina* and *R. venenata* extend to Canada, but have not been discovered north of Lake Superior.

Leguminosæ.—*Amorpha fruticosa*, false indigo; *A. canescens*, lead plant; and *A. nana*, grow abundantly on the prairies of Osnaboya, and are the only shrubby leguminous plants which extend to Rupert's Land. *Robinia pseudacacia* is plentiful in Canada East.

Cæsalpineæ.—*Gymnocladus canadensis*, the Kentucky coffee-bean tree; *Cercis canadensis*, red bud; and *Cassia chamæcrista*, partridge pea, have their northern limits in Canada or Wisconsin.

Rosaceæ.—*Prunus americana*, the wild yellow plum, seems to reach its northern boundary on the River Winipeg, not having been observed by me beyond the 50th parallel. Lieut. Abert gathered its fruit as far south as the banks of the Canadian and Pawnee forks of the Arkansas, on the 40th parallel. It is a common bush on the river banks in the Northern States. The American plums and cherries require further investigation, as the number of the species and their distinctive characters are imperfectly known. This one grows to the height of ten or fifteen feet on the Winipeg, producing in the woods long flexible branches, armed with a few slender sharp thorns. Its ripe fruit is fleshy and well flavoured, but rather mealy, of a yellowish colour inclining to orange. It has an ovoid shape, with a shallow groove on one side like a peach, is nearly an inch in diameter, and its stone is so much compressed that its thickness is less than half its width; while its length, being 0.63 inch, exceeds the width by a fourth part. The nut is oblique, with convex valves, being circumscribed by two unequal curves. One edge is acute, with a groove on each side of it; the other edge is occupied by a narrow groove. I have been thus particular in the description of the northern fruit, that it may be compared with plums growing in other districts. The fruit is the *Puckĕsāminan* of the Crees; and *La Prune*, or the plum, of the white residents.

The *Nekā-u-mina* of the Chippeways, or *Thekā-u-mina* of the Crees, and sand cherry of the residents on Rainy River and Lake Winipeg, is a bush or small shrubby tree a foot and a half high, which grows on sand hills. The bark of its annotinous and biennial shoots is reddish, and the older twigs are brownish, with small warty specks. When in fruit (in which state only I examined it in September, 1849) the fruitstalks are solitary, and spring from the base of the summer's growth; they are rather more than half an inch long, or about equal to the diameter of the fruit, which is black and rather austere, but edible. The stone is 0.38 inch long, almost regularly elliptical and acute at the ends,

but more so at one end than the other. Its valves are very convex, so that its width exceeds its thickness very little. The sides are not acute-edged: one suture is depressed, forming a shallow groove; on the other side, which is very obtuse and almost flattened, there is a furrow above and below the suture, and rather remote from it. The annotinous shoots are smooth, angular, and generally flexuose, with the leaves springing alternately at the curves. The leaves measure two inches and a half, the footstalk forming about one fifth part of this length. The lamina is lanceolato-elliptical; that is, nearly regularly elliptical, with an acute end, and a gradual tapering into the footstalk; it is serrated by acute, appressed teeth at the upper end, and is entire towards the footstalk; its under surface is pale and somewhat glaucous, the upper one dark green, and both sides are perfectly smooth. The footstalks are edged by the decurrent lamina for more than half their length, and the deciduous linear-lanceolate stipulæ are inciso-pinnate inferiorly. This cherry is probably the *Cerasus pumila* of Michaux and later American botanists. It was not traced by me beyond the 50th parallel.

Another small shrubby cherry grows, on moist sandy soil, by the banks of rivers and lakes, from Lake Superior to the Elk River on the 57th parallel. Its fruit is scarcely half the size of the preceding, but is, like it, black, and hangs generally on solitary footstalks, though the flowers grow by twos or threes in short racemes. This shrub lies close to the ground; makes no approach to the tree form; seldom exceeds a foot in height; and so much resembles the *Salix myrsinites* and some other depressed willows, that, on looking for catkins, I have not been undeceived until I found the footstalks of the last year's cherries. The fruit of this sand cherry is sweeter than that of the preceding one. Whether it be the *Cerasus depressa* of some botanists I cannot determine; nor do I pretend to clear up the confusion that exists in botanical works respecting *C. pumila* and *depressa*.

C. pennsylvanica, wild red cherry, the *Pāsis-so-wey-minan* of the Chippeways, and *Pāsi-ā-wey-minan* of the Crees, produces a small sour red fruit, which grows in a many-flowered raceme on long slender footstalks. Its equatorial limit, according to the United States' botanists, is the New England States and Pennsylvania, where it is a slender tree 20 or 25 feet high. Its polar limit is within the Saskatchewan basin, which it ascends towards the base of the Rocky Mountains, nearly to the height

of 2,000 feet above the sea. *C. virginiana*, choke cherry, is named by the Crees *Ta-kwoy-minan*, and by the Dog-ribs *Ki-e-dunnè-yerrè*. It was found by Lieut. Abert on the Kansas and Arkansas, and on Purgatory Creek; and is, in northern latitudes, a shrub with long branches. At Fort Liard, on the 61st parallel, it is 20 feet high, and on the confines of the arctic circle, where it terminates, it does not exceed four or five feet. The fruit can scarcely be said to be edible by itself, but it is often pounded, stones and all, and mixed with pemican. *C. serotina*, wild black cherry, is a general inhabitant of Rupert's Land, extending westward to the valleys of the Rocky Mountains on the Pacific side, where, however, it is generally dwarfed; and northwards to near Great Slave Lake. It is said by Dr. Gray to be a fine large tree in the Northern States, with purplish-black fruit, having a pleasant vinous flavour. Besides these I gathered specimens of a cherry-tree, not in flower, on Athabasca and Slave Rivers, which Sir William Hooker is inclined to consider as the *C. mollis*, discovered by the unfortunate David Douglas, on the banks of the Columbia, growing on subalpine hills to the height of from 12 to 25 feet.

Purshia tridentata inhabits the Rocky Mountain prairies near the head waters of the Missouri and Columbia, and extends northwards to the 49th parallel. *Spiræa opulifolia*, nine bark, ranges from Maine, Canada, and Wisconsin, westwards to the valley of Oregon, in which it is found from the sources of the Columbia downwards. It is common on the low islands of Lake Superior, and has its polar limit in the colony of Red River. *S. chamædrifolia* inhabits the north-west coast up to Sledge Island in Beering's Straits, and Chamisso Island in Kotzebue Sound. It does not cross the Rocky Mountains, nor does any other *Spiræa* go so far north on the east side of the continent. *S. betulifolia* is another western species which inhabits the Blue Mountains and Mount Hood, and crosses the Rocky Mountains to their eastern valleys between latitudes 52° and 54°, but does not descend to the lower eastern country. *S. tomentosa*, hard-hack or steeple-bush, is common in the meadows and low grounds of New England, and spreads through Nova Scotia, Canada, and Rupert's Land to Lake Winipeg. *S. douglasii* is an Oregon species resembling the preceding, which extends to the Straits of Da Fuca. *S. ariæfolia* forms part of the underwood in forests on the Pacific coast, on the Kooskoosky, Spokan, Flathhead, Salmon, and M'Gillivray

Rivers up to the 49th parallel. *S. salicifolia* is very abundant on the banks of every lake and river in the St. Lawrence and Saskatchewan basins, and northwards to Slave River. It is often associated with the *Myrica gale*, growing in the water. In its northern range it approaches the *S. chamædrifolia* of the west coast, but does not attain so high a latitude, owing to the greater severity of the climate on the east side of the mountains.

Rubus occidentalis, black raspberry or thimbleberry, extends from the Northern States to the Saskatchewan basin, and also to the Pacific coast. *R. strigosus*, wild red raspberry, is also found on both sides of the continent; on the east side it inhabits the United States, Newfoundland, and Canada, and may be traced in the interior canoe route throughout the Saskatchewan basin. *R. nutkanus*, white flowering raspberry, was discovered in Queen Charlotte's Sound by Mr. Menzies in lat. 51° on the Pacific coast, since which time it has been found in Norfolk Sound, lat. 57°, and traced down to Cape Orford in lat. 43°, and to the head waters of the Columbia in 52°. On the eastern declivity of the Rocky Mountains it grows between latitudes 52° and 54°, and on the River Winipeg, Lake Superior, and Upper Michigan. Near the Pacific it is ten feet high, and forms the underwood on the island of Sitka; but in the passes of the Rocky Mountains dwindles down to a foot or eighteen inches. In thickets on the Winipeg its leaves attain remarkable dimensions: the fruit is inedible. *R. odoratus*, purple flowering raspberry, is a native of the Northern States, Canada, and the country between Lake Superior and the Saskatchewan. *R. spectabilis* is a prickly shrub, ten feet high, inhabiting the Pacific coast from Oregon to Unalashka. *R. suberectus*, bramble. This species, which is also European, is an inhabitant of Newfoundland, and of the country between Lake Superior and the Saskatchewan, where it was found both in 1825 and 1848. *R. villosus* is common in the Northern States, and is found also in Nova Scotia and Canada-West up to Lake Huron and Wisconsin. It is included in Elliott's "Flora Carolina," but I have not ascertained its equatorial limit. *R. hispidus vel obovalis*, running swamp blackberry, is common in the Northern States, and extends through Canada to Lake Superior. *R. canadensis* (L.), *vel trivialis* (Pursh), low blackberry or dewberry, has a similar range with the preceding species. *R. nivalis* (Douglas), is an alpine shrub, found on the snowy ridges of the Rocky Mountains, and

not growing more than six inches high. There are also several herbaceous species of this genus; as *R. triflorus*, dwarf raspberry, which is common in the Northern States and throughout Rupert's Land, northward to Slave and Mackenzie Rivers. The Dog-ribs name it *Tāsillè-ki-eh*. Its northern limit is about lat. 68°. *R. chamæmorus*, cloudberry, is found on the White Mountains of New Hampshire near the limit of trees; also in Maine and Nova Scotia, Newfoundland and Labrador. In lat. 54°, and more to the north, it crosses the continent, and is found on the summits of the Rocky Mountains between latitudes 52° and 56°; in Unalashka, on the shores of Beering's Straits, and on the most northern promontories of the continent. Near the Arctic Sea it is a common plant on mossy plains, but produces fruit there only in fine seasons. The fruit, which has a rich honey flavour, perishes with the early frosts. It is perhaps the most delicious of the arctic berries when in perfection, but cloys if eaten in quantity. *R. stellatus*, resembling the preceding, has been found only at Foggy Harbour on the north-west coast. *R. arcticus* and *R. acaulis* inhabit the shores of Hudson's Bay, Labrador, and the country westward to Kotzebue Sound. Their southern limit seems to be in the Saskatchewan basin, in about lat. 53°. On many parts of the flat beaches of Slave and Mackenzie Rivers the lively red flowers of *R. acaulis* cover large patches of ground which are partially flooded by small rivulets. In woods the last-mentioned species has a stouter growth, and emits long flagelli which run among the mosses.

Potentilla fruticosa, the shrubby cinquefoil, grows abundantly from the northern states to the Arctic Sea, by river banks as well as in the most exposed and elevated situations. It occurs in the high valleys of the Rocky Mountains, at Pelly Banks on the west side of that range, and in Kotzebue Sound. On the Coppermine River near the sea it is almost herbaceous, the woody stem being extremely short and subterranean.

Rosa woodsii, *R. carolina*, *R. blanda*, *R. cinnamomea*, *R. majalis*, and *R. stricta* grow in the wooded districts; but, from their similarity to each other, their respective limits have not been ascertained. *R. blanda* was found flowering freely near the mouth of the Mackenzie on the 69th parallel. This species and *R. cinnamomea* cross to the Pacific coast. *R. woodsii* and *majalis* have been traced as far north as the Mackenzie. *R. nitida* and *lucida* grow in Newfoundland and in the New England States. *R. fraxinifolia* is confined to the Pacific coast; and *R. lævigata*

has not been found beyond Lake Huron. *R. setigera*, a fine climbing rose, grows from Ohio to Wisconsin, but has not been detected to the north of the great lakes.

Cratægus punctata, dotted thorn, is found everywhere in the Northern States, extends northwards to Wisconsin, and crosses the continent to the coast of the Pacific; but has not, so far as I have learnt, been found within the British territory. *C. glandulosa* occurs in Canada, and northwards to the south side of the Saskatchewan basin; probably also on the Pacific coast. *C. coccinea*, scarlet-fruited thorn, is a common low tree in the Northern States; was found by Lieut. Abert, as far south as Stranger Creek, in lat. 39°; and extends to Wisconsin and the great lakes. *C. cordata*, Washington thorn, is supposed by Dr. Asa Gray to have been introduced into New England, but to grow wild in Pennsylvania and the more southern states. It is found from Canada to the Saskatchewan and the valleys of the Rocky Mountains, and about the sources of the Columbia, in between lat. 52° and 54°. The *Cratægi* flourish on the banks of Rainy and Winipeg Rivers; but are scarce further north. Mertens found several in the forest lands of Sitka. *Amelanchier canadensis* (*botryapium et ovalis*), shad-bush and serviceberry, is *La Poire* of the voyagers, the *Misass-ku-tu-mina* of the Crees, and the *Tchè-ki-ch* of the Dog-ribs. This shrub extends along the banks of rivers nearly as far northwards as the woods go, and produces fruit up to the 65th parallel on the Mackenzie. It is common in the Northern States, in Nova Scotia, Newfoundland, and Labrador, and westward to the Pacific. The black fruit is about the size of a pea, is well tasted, dries well, and in that state is mixed with pemican, or used for making puddings: for which purpose it nearly equals the Zante currant. Its wood, being tough, is used by the natives for making arrows and pipe-stems, and has obtained on that account the name of *bois de flèche* from the voyagers; but in the United States the name of arrow wood is given to a different tree. The variety or species named *A. sanguinca* was traced up to the 60th parallel.

Pyrus rivularis, Powitch tree, inhabits Oregon and Vancouver's Island. Its fruit is edible, and its wood, which is hard enough to take a fine polish, is used for wedges. *P. americana*, the American mountain ash, is found on the southern parts of the Alleghanies, and more commonly in the swamps and mountain woods of the Northern States. It

is frequent on the shores of Lakes Huron and Superior; but is seldom seen on the canoe route beyond Lake Winipeg. On the acclivities and in the valleys of the Rocky Mountains, however, it ranges northwards to Fort Liard, near the 60th parallel. It has been observed as high as the 56th degree of north latitude on the Pacific coast, from whence it extends southwards through the subalpine regions of Oregon. *P. arbutifolia*, choke-berry, is common in the damp thickets of the northern states, in Newfoundland, in Canada, and onwards to the Saskatchewan basin; but was not observed so far north as the immediate banks of that stream.

GROSSULARIEÆ.—The species of this family seem to attain their maximum number to the north of the United States. *Ribes oxyacanthoides*, sharp-thorned gooseberry, inhabits Newfoundland, Canada, and the canoe route northwards to the 62nd parallel, or perhaps further. *R. cynosbati*, prickly gooseberry, is common in the rocky woods of the Northern States, and accompanies the preceding species northwards to Slave Lake. *R. saxosum* inhabits New England, the shores of Lake Huron, and the valley of the Saskatchewan, extending also probably to Oregon. *R. hirtellum*, short-stalked wild gooseberry, the most common species in New England, extends to Canada, Wisconsin, and northwards to Great Slave Lake. The preceding one seems to be considered by Dr. Asa Gray to be a variety of this species. *R. lacustre*, swamp gooseberry, is common in the most northern parts of the United States, and Nova Scotia; crosses the mountains to North California and Oregon; and extends northwards along the Mackenzie, nearly or quite to its delta. It is the *Tagossay-ki-eh* of the Hare Indians, which name is common to several kinds of gooseberry in the Dog-rib country, where there is a greater variety of species. *R. divaricatum* is common near Indian villages on the north-west coast, from 45° to 52° north lat. *R. rotundifolium*, Michx. (*triflorum*, Willd.), is a rare inhabitant of the mountainous districts of Oregon, and inhabits the Northern States from Massachusetts to Michigan and Wisconsin, but has not been found on the north side of Lakes Superior or Huron. *R. rubrum*, the common red currant, native both of Europe and America, extends from the northern states very nearly to the shores of the Arctic Sea, having been gathered beyond the 69th parallel; and it ranges westward to Kotzebue's Sound. It is the *Ki-eh-eth-lule-āzè* of the Dog-ribs and Hare Indians. *R. prostratum*, fetid currant, inhabits cold damp

woods from Nova Scotia and the Northern States northwards to the Athabasca, and westward to the Rocky Mountains and Oregon. The fruit is produced in copious racemes; but, in common with the foliage, it has an unpleasant odour, and a strong taste of turpentine. *R. hudsonianum*. This is the *Nut-sinnè* of the Dog-ribs, and is a common gooseberry from Hudson's Bay to the Rocky Mountains and subalpine districts of Columbia; also in a northerly direction on the Mackenzie to lat. 67°. *R. floridum*, wild black currant, resembles the preceding, and is a common species in the Northern States, westward to Wisconsin, and ranges northwards to lat. 54°. *R. sanguineum*, which has become so common an ornament of our gardens, is a native of the Pacific coast only, where it ranges from 38° north lat. to 52°. There are several other very handsome species in Oregon, and, among others, the rich *P. aureum*; but they have not been traced beyond the 49th parallel.

Araliaceæ.—*Panax horridum*, prickly ash-leaved panax, a twining shrub common in California, Oregon, and New Caledonia, as far north as 57° or 58°, crosses the Rocky Mountain ridge to the upper tributaries of the Saskatchewan, but does not descend to the eastward. *Aralia hispida*, bristly sarsaparilla, may be considered as the eastern representative of the preceding, though it is scarcely shrubby, having merely a very short, tough stem, almost buried in the crevices of the rocks from which it springs.

Corneæ.— *Cornus alba vel stolonifera*, red osier cornel. This willow-like shrub, which is the *osier rouge* of the voyagers, ornaments the river strands from the Northern States, Nova Scotia, and Newfoundland, northwards to near the mouth of the Mackenzie, and westward to the shores of the Pacific. It is named by the Crees, on account of the bright red colour of its twigs, *Mithkwa-pè-min-àhtik* (red stick), and its fruit *Muskwa-mina* (bear-berry), because the bears eat it. The Dog-ribs call this berry, *Kai-gossai-ki-eh*. A warm decoction of the bark and twigs is used by the natives for bathing their limbs when swelled by fatigue. *C. alternifolia*, *C. paniculata*, *C. sericea*, and *C. circinata*, which are inhabitants of the Northern States, are said to extend to Canada; but except the last named, which occurs on Lake Superior, none of them were gathered by us on the canoe route. *C. sericea* and *C. florida*, also Canadian species, cross the continent to Oregon, but do not occur north of the great lakes. The herbaceous *C. canadensis*

reaches the shores of the Arctic Sea, crossing the continent from east to west; and the *P. succica*, a European plant, is found in the Gulf of St. Lawrence, and on the west coasts of arctic America as high as Kotzebue Sound, and southwards to Oregon; but has not been detected in the interior districts.

Loranthaceæ.—*Arceuthobium oxycedri*, this leafless parasitical shrub, is common to Europe, Central Asia, and North America, where it grows on cedars and pine trees. On the eastern declivities of the Rocky Mountains it ranges from lat. 52° to 57° north, and also eastward to Hudson's Bay, growing on the *Pinus banksiana*. On the western side of the mountains, from the Spokan River in 47° north lat. to near the sources of the Columbia, it infests the *Pinus ponderosa*.

Caprifoliaceæ.—*Sambucus canadensis*, black-fruited elder, was gathered by Lieut. Abert on the Cottonwood Creek of the Neosha, in lat. 38½° north, at an altitude of about 1,400 feet. It has its northern limit in the Saskatchewan basin, and ranges westward from Nova Scotia across the prairies. *S. racemosa vel pubens*, the red-fruited elder, is common in the Northern States on the shores of Lake Superior, going northward to the Saskatchewan, and westward to Oregon. Its polar limit, as far as ascertained, is on the eastern declivity of the Rocky Mountains between 52° and 59° north lat. *V. prunifolium*, black haw, or sloe-leaved viburnum, reaches the north shore of Lake Huron; but is more common in New York and Ohio. *V. lentago*, sweet viburnum, is a handsome tree in the Northern States, grows in Nova Scotia and Wisconsin, and extends northwards to the south side of the Saskatchewan basin. *V. nudum*, withe-rod, is more common from New Jersey southwards than towards the great lakes; but occurs as far northwards as the last-named species. *V. dentatum*, arrow wood, is common in the low grounds of the Northern States up to Wisconsin, and is said by Pursh to extend to Canada; but it seems to be rare in that country. *V. acerifolium*, maple-leaved arrow wood, is a more northern species; and, in common with other shrubs that approach the arctic circle, it crosses the Rocky Mountains to the valley of Oregon, and also to Sitka. It has been traced as far north as Great Slave Lake, occurs also in Newfoundland, and is common in the rocky woods of the Northern States. *V. opulus vel oxycoccus*. Sir William Hooker is inclined to consider the European and American shrubs known by these names—

and of which the handsome snow-ball tree, or guelder rose, is a cultivated variety—to be one species, and Dr Asa Gray unites them. In America the shrub extends from the Northern States and Nova Scotia to lat. 68° on the Mackenzie, and perhaps very nearly to the verge of the woods. It also crosses to the Pacific coast, having been found in the valley of Oregon. Its fruit, of a bright pinkish red colour, has a sharp acid taste, and is the *Mongsö-a minā* (moose-berry) of the Crees, and the *Dunnè-ki-e* or Indian-berry of the Dog-ribs and Hare Indians. The fruit being sometimes used as a poor substitute for cranberries, has obtained for the bush the name of cranberry tree in the Northern States. *V. edule*, the *pembina* of the voyagers, was traced by us northwards to the Elk River. It is much less common than the preceding, and has a more fleshy and less acid fruit, of an orange-red colour. The voyagers relish this fruit; and it has given name to many of the rivers of Rupert's Land. It is the *Nipi-minan* (water-berry) of the Crees. Michaux, Dr. Asa Gray, and other authors consider it to be scarcely a variety of *V. opulus*: I have found, however, its foliage retaining pretty constantly its peculiar character. In *V. oxycoccus* the lobes of the leaves are separated by acute sinuses, and have long, tapering, jagged, or deeply serrated points. In *V. edule* the sinuses between the lobes are rounded, and the lobes themselves are shorter, though the lamina of the leaf is cut to within a short distance of its base. The European *V. opulus* has generally obtuse sinuses, and a less deeply cut lamina, but the lobes also short. Pursh, who separated *V. oxycoccus* from *edule*, described the bases of the leaves of the one as acute and of the other obtuse; but, as there seems to be no difference in that respect, it is probable that he meant the sinuses.

Diervilla trifida vel canadensis, bush honeysuckle, has a herbaceous aspect, and is one of the most common underwoods on the portages. It occurs in all the woody districts of the Saskatchewan basin up to the acclivities of the Rocky Mountains, but is rare to the north of Cumberland House. It grows also on Lake Superior, in Wisconsin, Nova Scotia, and the Northern States. *Lonicera parviflora*, small honeysuckle, has a conterminous range with the preceding. *L. douglasii* gathered on Saskatchewan is considered by Dr. A. Gray to be merely a variety produced by cultivation. *L. hirsuta*, hairy honeysuckle, is a coarse-leaved climber, common in moist rocky woods of the Northern States, and Canada as far as Lake Huron. *L. ciliata*, fly honeysuckle,

grows at Pictou, on the Catskill Mountains, in Ohio, Wisconsin, generally throughout the rocky woods of the Northern States; also on Lake Superior, and northwards along the whole Saskatchewan basin. *L. cærulea*, the mountain fly honeysuckle, extends northwards to the arctic circle; it likewise ranges from the Labrador coast and Newfoundland to the Rocky Mountains, and we should suppose also to the Pacific coast, since it is both a European and a Siberian species; but it is not named by Mertens or Bongard among the Sitka plants, nor does it appear to have been found by Douglas, Tolmie, or Scouler in Oregon. It grows in Wisconsin, New Hampshire, Massachusetts, and New York.

Symphoricarpus racemosus, snow-berry, and *S. occidentalis*, wolf-berry, range from Vermont, Michigan, and Wisconsin, over the St. Lawrence and Saskatchewan basins, to the 60th parallel on the Mackenzie. They also occur in the Oregon valley, Vancouver's Island, and doubtless much further along that coast.

Rubiaceæ.—*Cephalanthus occidentalis*, button bush. This shrub, which belongs to the sub-family of *Cinchoneæ*, occurs in thickets of the Northern States and Canada, but does not extend to Lake Superior.

Compositæ.—Of this large family no shrub has been detected in the canoe route north of Lake Superior; though the *Crinitaria viscidiflora* grows as high as the 55th parallel on the banks of the Salmon River, west of the Rocky Mountains, and on the upper branches of the Columbia above the Kettle Falls. A small annual herb was found on the Saskatchewan, which Sir William Hooker placed next this species; but, from the imperfect specimens, he could not ascertain its genus satisfactorily.

Vaccineæ.—*Gaylussacia resinosa*, black huckleberry, is common in the Northern States westward to Wisconsin, and extends northwards to the Saskatchewan. *Vaccinium corymbosum*, common swamp blueberry, extends from the Northern States to Newfoundland and Canada, as far north as Quebec, but has not been gathered to the westward of Lake Superior. *V. pennsylvanicum*, low shining-leaved blueberry, is very common in the dry rocky woods of the Northern States, Canada, and the country between Lakes Superior and Winipeg. *V. canadense*, downy-leaved blueberry, is the most abundant species by the sides of streams and in thickets, from Maine and Michigan to the shores of Hudson's Bay, and northwards in the woody districts to the

arctic circle. It extends also westward across the mountains to the upper feeders of the Columbia. *V. uliginosum*, bog bilberry, occurs on the summits of the New Hampshire Alps; on the Green Mountains of Vermont, and on Essex county mountains of New York; on the Newfoundland, Labrador, and Greenland coasts; also from Lake Superior northwards to the Arctic Sea. On the west side of the Rocky Mountains it has been gathered on Sitka, Unalashka, and Kotzebue Sound. In Europe it grows in the forests of the higher Jura, in England, and the Scandinavian peninsula. Beyond the arctic circle its fruit is not abundant every year; but in good seasons it is plentiful to an extraordinary degree, and is of a finer quality than in more southern localities. It then affords food to the bears and large flocks of geese, which fatten on it, and acquire a fine flavour. The berries, when frozen by the autumnal frosts, remain hanging on the bushes until the snow melts in the following June, and may then be gathered in a very juicy but tender condition. *V. salicinum*, willow-leaved bilberry, is an inhabitant of Unalashka. *V. myrtillus*, myrtle-leaved bilberry, was gathered by Mr. Drummond on the summit of the pass between the head waters of the Saskatchewan and Columbia, but has not been detected further to the east, though it is a European plant. Chamisso found a *Vaccinium* on Unalashka, which he was inclined to refer to this species; but his specimens were imperfect. Bongard, however, enumerates it as existing among the plants gathered by Mertens on Sitka. *V. myrtilloides vel angustifolium* is found in Canada, and from Hudson's Bay to the woody declivities of the Rocky Mountains, between the 52nd and 54th parallels. It crosses the dividing ridge also to the alpine valleys of Oregon, and to the sea-coast further north, where the purplish-brown fruit is eaten with relish by the natives. *V. cæspitosum*, dwarf bilberry, grows on the alps of New Hampshire, the shores of Lake Superior near James' Bay, and northward to the valley of the Saskatchewan and the Rocky Mountains, between 52° and 57° north; also in the Oregon valley. *V. ovalifolium* grows in Oregon from the mouth of the Columbia up to the Portage River, near the crest of the Rocky Mountains, on the 50th parallel, and also on the island of Sitka at lat. 57° north. *V. vitis-idæa*, cow-berry, or alpine cranberry, is the *Wi-sā-gù-mĭnā* of the Crees, and the cranberry most plentiful and most used throughout Rupert's Land. This berry is excellent for every purpose to which a cranberry can be applied; and

though inferior to the *V. oxycoccus* in flavour in autumn, is far superior to it after the frosts; and, as it may be gathered in abundance in a most juicy condition when the snow melts in June, it is then a great resource to the Dog-ribs and Hare Indians, as well as to the immense flocks of water-fowl that are migrating to their breeding places at that date. It grows in perfection, in the most exposed situations, round a boulder or granite rock, over whose face its branches may spread, and where it can have at one time both moisture and the reflected heat of the sun's rays. It is found at Danvers, in Massachusetts, in Maine, and the higher mountains of New England, where its fruit is reported by Dr. Asa Gray to be barely edible, bitter, and mealy. In the parallel of Lake Superior it spreads from the Atlantic to the Pacific (being absent, however, on the prairies). In a higher latitude it crosses the continent also from Churchill Fort to Sitka and Kotzebue Sound, and it extends in the middle districts to the Arctic Sea in latitude 71°. In Sitka its leaves are said to be small. In Rupert's Land they vary in size, according as the plant is exposed or under shade. *V. ovatum* is common in Oregon and rocky places of the west coast northwards to the 49th parallel. *V. oxycoccus*, dotted cranberry, is, like the preceding, common to the New and Old World. It grows in peat bogs from New England and Wisconsin, northwards to the arctic circle, and from Newfoundland and Labrador to the Rocky Mountains, between 52° and 57° north lat.; in Sitka on the latter parallel, and in Kotzebue Sound. *V. macrocarpum*, American cranberry, is common in the peat bogs of the Northern States, and has its limit in the Saskatchewan basin. It crosses the continent from Newfoundland to Oregon; and the natives near the mouth of the Columbia eat its fruit, when boiled, under the name of *Su-labich*. *Chiogenes hispidula*, creeping snowberry, is common in the Northern States, where it grows under evergreens in turfy places. It extends across the continent from Newfoundland to the sources of the Columbia, and northwards along the Rocky Mountains to the 55th parallel.

Ericeæ.—*Gaultheria procumbens*, creeping winter-green tea-berry, chequer-berry, partridge-berry, or box-berry. This fragrant creeping shrub is a great ornament of the woods north of Lake Superior. It inhabits moist woods in the Northern States, grows at Pictou and on Lakes Huron and Superior, and was traced by us northwards to the Lake of the Woods, or near the 50th parallel. *G.? myrsinites* has

hitherto been found on the declivities of the Rocky Mountains only between the 52nd and 57th parallels. Mr. Drummond says, that its small berries have a delicious pine-apple flavour. The plant was cultivated in the Botanic Garden at Glasgow, but I have not heard that it produced fruit there. *G. shallon* is an Oregon plant growing between Cape Mendocino and Puget Sound, but not extending inland more than a hundred miles from the sea-coast. *Epigæa repens*, ground laurel, or trailing *Arbutus*, inhabits sandy and rocky woods in the northern states, Canada, Nova Scotia, Newfoundland, and Rupert's Land, as far north as the Saskatchewan. *Arbutus menziesii* and *A. tomentosa* inhabit Oregon northwards to Puget Sound; but no true *Arbutus* has been detected on the east side of the Rocky Mountains. *Arctostaphylos uva-ursi*, bear-berry, is common to Europe and America, and descends from the Arctic Sea-coast to Rainy Lake and the rocks and hills of the Northern Sates. It crosses the continent to the valley of Oregon, where the Chenook Indians mix its dried leaves with tobacco. It is used for the same purpose by the Crees, who call it *Tchakashè-pukk*; by the Chepewyans, who name it *Klèh*; and by the Eskimos north of Churchill, by whom it is termed *Attung-ā-wi-at*. On account of the Hudson's Bay officers carrying it in bags for a like use, the voyagers gave it the appellation of *Sac-a-commis*. On the north-west coast, Mertens found it at Sitka, and it doubtless extends along the whole coast. Its dry farinaceous berry is utterly inedible. *A. alpina*, alpine bearberry, though a herbaceous plant, may be mentioned with the others: it is also European. In the United States the only habitat given is the Alps of New Hampshire; but it grows at a much lower altitude in Newfoundland and Canada. It was found by Drummond on the Rocky Mountain ridge, and is very common on the barren grounds beyond the woody district, and along the whole arctic coast to Kotzebue Sound. There are two varieties, one with bright red and more juicy fruit; the other, having a dark purplish-black berry, of more fleshy consistence, and a stronger peculiar flavour. Both are eaten in the autumn; and, though not equal to some of the other native fruits, are not unpleasant. The two kinds are exactly alike in foliage. *Andromeda hypnoides*, moss-like andromeda, an inhabitant of the Alps of New Hampshire, Mount Marcy in New York, Labrador, and the north-west coast, was not detected by us on the interior canoe route. *A. lycopodioides*, a Kamtschatka plant was found by Chamisso on

Unalashka. *A. cupressina* inhabits the Rocky Mountains in lat. 56° north. *A. mertensiana* and *A. stelleriana*, so named by Bongard, were discovered on Sitka by Mertens. *A. tetragona* is one of the most northern plants, being an inhabitant of the north end of Spitzbergen. It occurs on all the islands and coasts of the Arctic Sea, from Greenland to Kotzebue Sound, at Sitka, and as far south as Mount Hood on the 45th parallel. It is also a Lapland and Siberian plant. Like the two preceding species, it is rather a wiry herb than a shrub. The withered leaves of past years remain attached to the thread-like stem, and may be used as fuel, a fact which Mr. Rae so fully demonstrated, as we have mentioned, in a preceding page. *A. polifolia*, rosemary andromeda, inhabits the Alps of New Hampshire and New York, Wisconsin, Lake Superior, and the country northwards to the Arctic Sea; also the whole breadth of the continent from Newfoundland and Labrador to Sitka and Kotzebue Sound, with the exception of the prairies. It is an inhabitant also of the higher Jura. *A. calyculata*, rusty-leaved andromeda, grows in sphagnous bogs and on the flooded strands of clear streams in the Northern States, and Rupert's Land as far as the upper part of the Mackenzie, and also on the shores of Beering's Sea. *A. racemosa*, cluster-bearing andromeda, grows in the moist copses of Canada, Massachusetts, and New Jersey near the coast, extending from thence southwards. *A. ligustrina*, privet andromeda, a common shrub of the Northern States, extends northwards to the Saskatchewan basin. In this genus and in *Arbutus* it may be noticed, that the more herbaceous species have generally the highest range.

Phyllodoce taxifolia, or *Menziesia cærulea*. This English plant grows on the New Hampshire Alps, and has been found on the Labrador coast. Steller is also said to have gathered it on the American coast and islands opposite Kamtschatka. *M. ferruginea* and *M. aleutica* were found by Mertens at Sitka; the former, which is one of Menzies's discoveries, has since been gathered by Seeman on the coast of Beering's Sea, and the latter was previously found by Chamisso on Unalashka. *Menziesia glanduliflora* is one of Mr. Drummond's discoveries on the Smoking River, an elevated tributary of Peace River, on the 55th parallel. It is remarkable for its gracefully drooping yellow flowers. *M. empetriformis* inhabits Vancouver's Island and the alpine districts of Oregon. *M. grahamii* and *M. intermedia* grow on the Rocky

Mountains, in lat. 55° eastward of their crest. *M. globularis* inhabits the same districts on the Smoking River northwards to 56°; and, according to Pursh, it occurs also on the high mountains of Carolina, and on the Cacapon Mountains, near Winchester, in Virginia. None of the *Menziesiæ* are mentioned by Dr. Asa Gray as existing in the Northern States; and it would appear that many of the species are very local, particularly the alpine ones.

Kalmia latifolia, calico bush, mountain laurel, or spoon wood, forms dense thickets on the mountains of Carolina and Pennsylvania, and is common northwards from Maine to Ohio and Canada, where it is a much humbler shrub. It was not observed by us on the north side of the St. Lawrence basin. *K. glauca* inhabits moorish places from the Northern States to the Arctic Sea, and crosses the continent to Sitka. *K. angustifolia*, sheep laurel, is common in the Northern States and Canada, to James's Bay and Newfoundland. We did not observe it on the canoe route north of Lake Superior. *Azalea viscosa* inhabits the Northern and Eastern States and Canada, but was not seen by us beyond the St. Lawrence basin. *A. nudiflora*, purple azalea, or pinxter flower, a common shrub in the Northern States, extends to Canada. The *Rhododendron maximum*, which is common on the mountains of Carolina and Pennsylvania, and is more rare in the Northern States and Canada, grows also in Oregon, on the subalpine range of Mount Hood, and more to the north on the high mountains near the "Rapids" of the Columbia. *R. lapponicum*, Lapland rose-bay, is another arctic plant which is found isolated on the peaks of the White Mountains of New Hampshire, and on Mount Marcy in the north corner of New York. It has been gathered as far south on the coast as the Labrador peninsula and the shore between York Factory and Churchill River, and grows on the summits of the Rocky Mountains on the 56th parallel, and throughout the whole extent of the barren grounds from Repulse Bay to Norton Sound, and northwards to the Arctic Sea. An infusion of the leaves and flowering tops was drunk by us instead of tea, but it makes a less grateful beverage than the *Ledum palustre*. It is a Scandinavian plant. *R. kamtschaticum* is an inhabitant of the north-west coast in lat. 53°, and of Unalaschka, as well as of the Asiatic shore. *R. albiflorum*, an elegant and ornamental plant, was discovered by Drummond on the Rocky Mountains between 52° and 57° of north latitude, where alone it has

been found.

Loiseleuria vel azalea procumbens inhabits the alps of New Hampshire, and the coasts of Newfoundland, Labrador, Hudson's Bay, and the Arctic Sea; also the north-west coast at Mount Edgecumbe, Sitka, and Kotzebue Sound. *Ledum palustre*, narrow-leaved Labrador tea, the *Kā-ki-ki-pukwā* (perennial leaves), or the *maskègo-pukwā* (medicine leaves), of the Crees, is an inhabitant of the colder parts of Canada, the coasts of Newfoundland and Labrador, and the whole of Rupert's Land to the Arctic Sea, on whose shores it grows from Repulse Bay and the mouth of the Thlewee-choh to Kotzebue Sound. It is also found at Sitka; but Dr. Asa Gray has seen no specimens gathered south of the United States' boundary line. It is frequently used as a substitute for tea. *L. latifolium* grows in the woody districts of Rupert's Land, often in the immediate vicinity of the other species; but extends further south, being common in cold boggy grounds in the Northern States.

Monotropeæ.—*Cladothamnus pyrolifolius* (*Tolmiea*, Hook.) inhabits Norfolk Sound on the Pacific coast in lat. 57°, and the country southwards to Puget Sound. *Chimaphila umbellata*, Prince's pine, Pipsissewa, goes northward to 53° on the Rocky Mountains, but does not pass the 50th parallel in the much lower country through which the canoe route lies. It crosses the dividing range, descends to the mouth of the Columbia, and is common in the Northern States. The Chippeways, in whose country it grows abundantly, do not appear to have discovered its admirable diuretic qualities. *C. maculata* is a more southern species: it was gathered by us on the great lakes, but is not common north of the Middle States.

Jasminæ.—*Fraxinus sambucifolia*, black ash, is said to grow in Virginia, and by Dr. Asa Gray to range from Maine to Wisconsin. It also inhabits New Brunswick, Nova Scotia, and Canada. *F. americana*, white ash, was found by Lieut. Abert on the Arkansas, high up on the western slope of the Mississippi valley. It is a large forest tree in the Northern States. It grows at Pictou, also on Lake Superior, Rainy Lake, the River Winipeg, and the banks of the Saskatchewan, to latitude 54° north, where it is still a tree. *F. pubescens*, red ash, does not grow thicker than a man's thigh on Rainy River, where it terminates near the 49th parallel. It extends southwards to the Middle States, and also across the mountains to Oregon.

Eleagnaceæ.—*Eleagnus argentea*, silver berry, is a very common shrub on the banks of rivers throughout the basins of the Saskatchewan and Mackenzie, up to the 68th parallel of latitude. Its dry husky berries are covered with the same silvery epidermis that gives the hoary appearance to the leaves, and are used by the Kutchin to ornament their dresses. This apparently sapless fruit is often found in the stomachs of geese on their northerly migrations. It is the *wapow-muskwa-minan*, or "white-bear berry," of the Crees; and the branches, which harden in drying, are used by the natives for making pipe-stems. It ascends the Saskatchewan, and occurs in Canada, but does not find a place in Gray's "Flora of the Northern States." *Shepherdia canadensis* grows from Vermont and Wisconsin northwards to beyond the arctic circle, and is very common on the Mackenzie. Its small, red, juicy, very bitter, and slightly acid, berry is useful for making an extempore beer, which ferments in twenty-four hours, and is an agreeable beverage in hot weather. *S. argentea* is a prairie shrub common to the plains of the Missouri and Saskatchewan, but which does not grow in the eastern districts. It is the *Mith-yŭ mìnā* or blood-red berry of the Crees.

Thymeleæ.—*Dirca palustris*, leather-wood, is common in the Northern States, and extends to the north side of Lake Superior, disappearing about the Lake of the Woods.

Empetreæ.—*Empetrum nigrum* occurs on the alps of New Hampshire and New York, and is found throughout the whole extent of Rupert's Land up to the Arctic Sea, along which it ranges to Kotzebue Sound, descending the western coast to Sitka, and perhaps lower. It is absent only on the prairies. In the more sandy tracts of the barren grounds it covers the surface with its prostrate branches, that are loaded with fruit in favourable seasons. The snow-geese feed and fatten on the berries, which, after the fresh frosts, become very juicy, and are highly refreshing to the weary and thirsty traveller.

Ulmaceæ.—*Ulmus americana*, white elm, was found by Lieut. Abert on the Pawnee Fork in latitude 38° 10′ N., at an elevation of 1,658 feet; and Dr. Asa Gray informs me that it descends to Texas. It is a majestic tree in the Northern States, much prized for its rapid growth and the beauty of its form. Its wood is in requisition there for the use of wheelwrights. On the north banks of the Saskatchewan, in about latitude 54°, which is its polar limit, it grows only in rich alluvial soil, and, being

crowded among balsam poplars and other trees which inhabit such places, does not exhibit its handsome outline so as to strike the eye. Its timber there is often decayed at heart, and, even when sound, is so porous that we found it to be unfit for planking boats. It is probable that the *U. fulva*, slippery or red elm, known by the corky and angled bark of its branches, has an equal northerly range; but we did not trace it, though two kinds extend to the Saskatchewan, and we gathered their flowers. It is perhaps an elm of which I heard, but did not see in leaf, which inhabits wet places on the banks of Rainy River, and produces a wood that is considered there to be of no value. Dr. Asa Gray has not traced *U. fulva* on the Atlantic side of the Alleghanies further south than Maryland. *Celtis occidentalis*, sugarberry or hackberry, is common in the Northern States, and extends to Wisconsin and to the Oregon, but was not seen by us on the north side of Lake Superior.

Juglandineæ.—*Juglans cinerea*, butter-nut; *J. nigra*, black walnut; *Carya alba*, shell bark or shag bark hickory; *C. amara*, bitter nut or swamp hickory; and *C. glabra*, pig nut or broom hickory, reach Wisconsin and the basin of the St. Lawrence, but were not seen by us north of Lake Superior.

Cupuliferæ.—*Quercus obtusiloba vel stellata*, post oak, abounds in Texas as far as San Antonio de Bexar, wherever any hard wood grows. It was traced with *Q. rubra*, red oak, as far as the River Winipeg. Of the latter, Dr. Asa Gray says that he does not know whether it extends to Texas or not. It is a good-sized tree in the Northern States, and common in rocky woods. *Q. alba*, white oak. This, a most valuable forest tree in the Northern States, ranges northwards to Lake Winipeg, where it has a crooked and rather unsightly growth of 20 feet. Michaux states that its southern limit is in Florida; but I do not find it in the lists of plants gathered by Messrs. Emory and Abert in their journeys from Fort Leavenworth on the Missouri to North Mexico and California. *Q. bannisteri*; *Q. tinctoria*, quercitron or black oak; *Q. macrocarpa*, burr oak; *Q. bicolor*, swamp oak; *Q. prinos*, swamp chesnut oak; and *Q. palustris*, pin oak, grow in Canada or Wisconsin, but were not detected by us to the north of the great lakes, with the exception perhaps of *Q. macrocarpa*, since I gathered the immature acorns of an oak resembling this on Rainy River. *Q. garryana* inhabits Oregon northwards to Puget Sound, is a tree which reaches 80 feet in height, and is well adapted for

shipbuilding.

Fagus ferruginea et sylvestris, American beech; is said by Pursh to range southwards to Florida; it ceases at Mackinac on Lake Huron, and does not grow on Lake Superior, but re-appears further to the north-west on the Red River of Lake Winipeg, beyond which it was not seen. *Carpinus americana*, hornbeam, blue or water beach, called also iron wood, inhabits Canada, Wisconsin, and the other Northern States, but was not seen by us on the canoe route. *Ostrya virginica*, hop hornbeam. This tree, which has also the trivial name of iron wood, grows as far north as the River Winipeg, and is plentiful on Rainy and Red Rivers. Its southern range, according to authors, is to Carolina and Georgia.

Corylus americana, hazel nut, and *C. rostrata*, beaked hazel nut, range northwards to the Saskatchewan, the former also crossing the continent to the Pacific coast.

Myricaceæ.—*Myrica gale*, sweet gale or Dutch myrtle, is also a European shrub. It is common in North America, on the stony margins of lakes, and in peat bogs, from Virginia to the arctic circle, and in the island of Sitka. The native population of Rupert's Land use the buds as a material for dyeing. *Comptonia asplenifolia*, sweet fern, is common in the Northern States, and terminates on the northern slope of the Saskatchewan basin; it ranges southwards along the mountains of Carolina and Georgia.

Betulaceæ.—*Betula papyracea*, paper or canoe birch, is an invaluable tree to the population of Rupert's Land. Its bark is indispensable for the construction of their canoes, and also serves for the covering of tents in localities where the skins of large animals are scarce. Neatly sewed and ornamented with porcupine quills, it is moulded into baskets, bags, dishes, plates, and drinking vessels; in short it is the material of which most of the light and easily transported household furniture of the Crees is formed. The ruder Tinnè use it, but dispense with many of the forms into which it is worked by their southern neighbours. The wood serves for paddles, the framework of snow shoes, sledges, hatchet helves, and occasionally for gun-stocks; and in spring the sap forms a pleasant sweet drink, from which a syrup may be manufactured by boiling. Beyond the arctic circle it is a scarce and crooked tree, but occurs of a small size as high as the 69th parallel. It grows in perfection

on the north shore of Lake Superior, in the neighbourhood of Fort William, where, owing to the ample supply of good bark, a manufactory of canoes for the use of the Hudson's Bay Company has been established. As the Kolushes north of Sitka use birch-bark canoes, I infer that this tree extends to the Pacific; but I have not seen it in the lists of plants of that coast. Pursh mentions Hudson River as its southern limit; and Gray states its range as extending from New England to Wisconsin, but chiefly through the northern parts of that district. It grows in Nova Scotia, Newfoundland, and Labrador. *B. occidentalis* occurs in Oregon, along the Rocky Mountains, northwards to the straits of Da Fuca, and crosses the ridge to the vicinity of Edmonton House, on the 54th parallel. *B. excelsa*, yellow birch, was not traced by us beyond the banks of the Kamenistikwoya, which falls into Lake Superior. In the Northern States it is a stately tree, 60 feet in height. *B. lenta*, cherry or sweet birch, is a rather large tree, which is common in the Northern States, Nova Scotia, Canada, and Newfoundland; but does not appear to go far westward, as it was not found by us nor by Agassiz on Lake Superior. *B. pumila vel glandulosa*, little birch, is rare in New England, but grows in bogs of the northern parts of Pennsylvania, Ohio, Michigan, and Wisconsin; also in Nova Scotia, Canada, Newfoundland, and Labrador. It goes considerably beyond the arctic circle, being found on the banks of the Thlewee-choh, the Coppermine river, and other arctic streams, and also on the Mackenzie to about the 68th parallel. It is very like the following, but has a more erect and slender growth, which may be perhaps owing to locality. The leaves are generally longer. *B. nana*, dwarf birch, exists on the summits of the White Mountains of New Hampshire, and of the Essex Mountains of New York. It grows also in the higher parts of Labrador and Canada, along the shores of the Arctic Sea, from Davies' Straits to Kotzebue Sound; and generally throughout the Barren Grounds. *Alnus viridis*, green or mountain alder, and *A. incana*, speckled or hoary alder, range northwards to the delta of the Mackenzie on the 68th parallel, and from Newfoundland and Labrador to Kotzebue Sound; the first species being also found on Sitka. They are common bushes in New England and Wisconsin; but I have not seen their southern limits mentioned. *A. rubra*, red alder, is an inhabitant of Sitka and Norfolk Sound, and extends southwards to Oregon. It seems to be the western representative of the *A. serrulata* of the southern parts of New

England.

SALICACEÆ.—Willows are numerous on the east side of the Rocky Mountains, and seem to attain the maximum development of species in the southern parts of Rupert's Land, but to be less abundant on the Pacific coast, except to the north of the peninsula of Alaska. From Lake Superior to the Arctic Sea they form dense thickets on the shores of every river and lake. It is scarcely possible to note the range of willows, or to collect satisfactory specimens of the species on a rapid journey, as many of them which perfect their catkins before the evolution of their leaves, remain undetermined in the herbarium. Of twenty-two species described by Dr. Asa Gray as inhabitants of the Northern States, only *S. tristis*, Aiton; *S. humilis*, Marshall; *S. sericca*, Marshall; *S. alba*, L.; and *S. angustata*, Pursh, were not collected by us on our northern voyages. *S. uva ursi*, *S. repens* vel *fusca*, and *S. herbacca*, which grow on the alps of New Hampshire, extend beyond the arctic circle on both sides of the continent, the latter being one of the most northern plants, as it grows on the north end of Spitzbergen. The other fourteen named by Dr. Gray reach one or more of the northern basins.

The following were traced from Lake Superior to the arctic circle, or beyond it: *S. villosa*, *S. rostrata*, *S. discolor*, *S. viminalis*, *S. lucida*, *S. longifolia*, *S. cordata*, *S. rigida*, *S. planifolia*, and *S. pedicellaris*. Some others were not gathered higher than the valley of the Saskatchewan, but their southward range included the St. Lawrence basin: as *S. Candida*; *S. petiolaris*, *S. rosmarinifolia*, *S. purpurea*, and *S. fragilis*.

S. drummondii, *S. barattiana*, and *S. cordifolia* were gathered near the elevated sources of the Saskatchewan only, though the last named has been detected by other collectors on the Labrador coast. *Salix sitchensis* is known only as an inhabitant of the island from whence it derives its name. *Salix richardsonii* and *S. acutifolia* are common to the Saskatchewan and Mackenzie River basins, the former being also an inhabitant of the coast between York Factory and Churchill.

The following are specially arctic in their habitats: *S. myrsinites*, *S. vestita*, *S. speciosa*, *S. reticulata*, and *S. nivalis*, which grow on the peaks of the Rocky Mountains between 52° and 57° north, and within the arctic circle, some of them reaching very high latitudes. *S. reticulata* grows on the coast between York Factory and Churchill. *S. speciosa*

inhabits the Arctic Sea coasts from Coronation Gulf to Kotzebue Sound, and ranges southwards on the Mackenzie to about the 60th or 61st parallel. It is perhaps the handsomest of the genus, having an agreeable growth, and very large leaves, which are of a silvery whiteness beneath, and when bruised have a rather pleasant odour. On the Mackenzie it grows to the height of 15 feet, in form of a bush, with very stout and long yearly shoots, which distinguish it from all the other willows of the same localities On the coasts of the Arctic Sea, wherever the rivers afford a suitable point of alluvial soil, a thicket of this willow may be expected as tall as a man. Mr. Seeman observed it in the tree form on the north-west coast, where it is from 18 to 20 feet in height, and having a stem five inches in diameter. It resembles *S. lapponum* in its habit. *S. stuartiana* and *S. retusa* grow on the more northern banks of the Mackenzie and in Kotzebue Sound, and have not as yet been detected south of the arctic circle. *S. rostrata*, *S. speciosa*, *S. lucida*, *S. longifolia*, *S. depressa*, *S. reticulata*, *S. arctica*, and *S. polaris*, have been enumerated by authors as crossing to the Pacific side of the Rocky Mountains in their respective zones. *Salix glauca* was found by Seeman on the shores of Beering's Sea.

The following are not confined to the American continent, but range to either Europe or Asia, as well as to Rupert's Land, or the arctic coasts: *S. petiolaris*, *S. rosmarinifolia*, *S. viminalis*, *S. purpurea*, *S. fragilis*, *S. acutifolia*, *S. fusca*, *S. myrsinites*, *S. stuartiana*, *S. reticulata*, *S. herbacea*, *S. polaris* and *S. ammaniana*.

The most common in Rupert's Land are the *S. rostrata*, which extends southwards to New England, and in the north forms almost impenetrable thickets 20 feet or more in height, in which the old twisted and sordid grey stems spread in all directions. *S. longifolia*, which has the growth of an osier, covers the new-formed sandbanks of the rivers up to the 68th parallel, its flexible, densely growing young stems serving to arrest the mud, and speedily to raise the bank above the ordinary level of the water. In drier spots, by river banks in the Saskatchewan basin, it forms bushes from 20 to 25 feet in height. Even in the passes of the Rocky Mountains, as at Jasper Lake, it grows freely on drifting sands. Lieut. Abert found it growing at Council Grove, and Hundred-and-ten-mile Creek, at the height of 1,200 feet above the sea, between the 38th and 39th parallels. It inhabits also the banks of the Susquehannah, and all

the Northern States. The soft pliable twigs are a favourite food of the moose-deer, and might, indeed, as they grow on the flooded sandbanks, be mowed like hay. *Populus balsamifera*, balsam poplar, or tacamahac, was found growing on the banks of the Mackenzie up to lat. 59°, where it makes a very slender tree. In the southern part of the delta of that river it forms groups of healthy young trees, and from thence to the United States it flourishes on rich alluvial and occasionally flooded banks of rivers to the exclusion, on such spots, of most other trees: its trunk attains a greater circumference than any other member of the northern forest, but its wood is of no value, except for fuel; and, when old, the tree is unsightly from having very generally lost its top. Its growth is rapid, and its decay apparently equally so. I measured some drift logs of this tree which were floating down the Mackenzie, and found them to be about 15 feet in circumference, with a very moderate tapering upwards. The Crees name it *Mathèh-mètus*, or ugly poplar. Dr. Asa Gray gives as its southern limit New England, Wisconsin, and perhaps Pennsylvania, but not further. It crosses Beering's Sea to Kamtschatka; and on the rivers of Oregon it grows, according to Douglas, to the height of 140 feet, and 20 feet in diameter. *P. candicans*, balm of Gilead, which greatly resembles the preceding, has not been detected north of Wisconsin: it is the common balsam poplar of Pennsylvania, New York, and New England. *P. monilifera*, *lævigata vel canadensis* (Mx.), is a more southern species, being rare in New England, but taking the place of *P. candicans* in Western Pennsylvania, Ohio, and Kentucky. It grows on the banks of the Arkansas and other southern tributaries of the Missouri. *P. tremuloides*, aspen. Dr. Gray believes that, south of Pennsylvania and Kentucky, this tree is confined to the Alleghanies, and even on these mountains it is rare. In the Northern States it is common, and varies in height from 20 to 50 feet. It abounds in Rupert's Land in the more fertile soils, and very generally springs up in place of the white spruce, when that tree has been destroyed by fire. Its range is co-extensive with the forest land; but towards the Arctic Sea, and in lat. 69° on the Mackenzie, it is a slender willow-like tree. It is the best fire-wood in the country, but is applied to no other economical purpose, except that its ashes are collected on account of the abundance of potash they contain. I do not know whether it inhabits the Pacific coasts or not. *P. grandidenta*, big-toothed aspen, is common in the Northern States, and

reaches New Brunswick and Canada, but did not come under our notice on the canoe route.

Platanaceæ.—*Platanus occidentalis*, American Plane-tree, resembles the well-known *P. orientalis* in the way that its exterior bark falls off in thin plates. It extends northwards to Canada, but does not appear north of Lake Superior.

Coniferæ.—*Pinus banksiana*, gray pine, the *Cyprès* of the voyagers, grows from the arctic circle on the Mackenzie, down to the great Canada lakes, south of which, Dr. Gray has scarcely seen it, but has heard that it is found in the northern districts of Maine; and it occurs in the list of Wisconsin plants published by the American Association. It crosses the Rocky Mountains to the Spokan River in latitude 47° north. This would be an ornamental tree on many sandy and otherwise unproductive wastes. *P. resinosa*, red pine, has its southern limit, according to Emerson, at Wilkesbarre, in Pennsylvania (latitude 41½° north). I have traced it to 56½° of latitude on Methy River, and it crosses the Rocky Mountains to latitude 43° in Oregon. Dr. Gray says that its height in the northern states is from 60 to 80 feet, and Emerson relates that a few years ago it was not uncommon to find trees of this species in the southern parts of Maine exceeding 100 feet in height, with a stem four feet in diameter. *P. inops*, which was not seen by us on the canoe route to the north of the United States' boundary, extends on the north-west coast from Oregon to Sitka, and ascends Mount Rainier to near the snow limit. *P. strobus*, white or Weymouth pine, has its equatorial limit on the Alleghanies of Virginia or North Carolina, and it ranges northwards to the south end of Lake Winipeg. In the Middle States this tree has a shaft of 100 feet; and Emerson has collected instances of trees formerly existing which had the extraordinary length of from 220 to 260 feet. Even near its northern termination it is still a stately tree.

Abies balsamea, balsam fir, was not traced beyond the 62nd parallel on the canoe route. It is *Le Sapin* of the voyagers, who prefer its spray to that of any other tree for laying the floor of a tent or winter bivouack. Dr. Gray traced it on the Alleghanies only to Pennsylvania. In the latitude of Norfolk Sound (57°) it crosses the Rocky Mountains to the Pacific. In Virginia, North Carolina, and Georgia, *Pinus fraseri*, or the small fruited balsam fir, occupies the Alleghanies to the exclusion of the preceding. It does not reach the great lakes. *A. canadensis*, hemlock spruce, was

observed on the Kamenistikwoya, but not further north than the 49th parallel; though Mr. Tolmie traced it up to the 57th degree of latitude on the shores of the Pacific, and it was observed by Mertens on Sitka. In Maryland this species is found on the Alleghanies only; and Dr. Gray thinks that it ceases to grow in North Carolina and Tennessee. *A. alba*, white spruce. Of this species we have had frequent occasion to speak in the preceding pages, as it is especially the forest tree in Rupert's Land. It is *L'epinette blanche* of the voyagers, and the *Mina-hik* of the Crees. Within the arctic circle it seldom exceeds 40 or 50 feet in height; though in ravines, where it is well-sheltered, and has a suitable soil, it attains twice that altitude. Its age in these high latitudes exceeds 400 years before it shows signs of decay. It most probably has a range from one side of the continent to the other, but has not yet been detected on the west coast. From the 69th parallel on the Mackenzie, it crosses obliquely to the 61st or 60th on the coast of Hudson's Bay; and it is the common spruce in Canada, Nova Scotia, New Brunswick, and New England, but its southern limits are unknown to Dr. Gray. In Canada the sweet cedar is much used for the thin hoops (*varandes*) and lining of the bark canoes, being a straight-grained light wood; but in more northern districts the white spruce supplies its place. It is also exclusively used north of Lake Winipeg, for building purposes, sawing into deals, and boat-building. With its tough roots split to a convenient thickness, and used under the Cree appellation of *Watap*, the pieces of canoe bark are sewn together; and, in districts where birch bark is scarce, a rude canoe is formed of the bark of a spruce fir. A well grown tree, with 30 feet or so free from branches, is chosen; an incision made down to the wood along one side; and the bark, being skilfully raised in one piece, receives the canoe shape by the two ends being skewered together and stuffed with a few branches to add stiffness. The cargo is then placed in the middle, and two or three Indians will descend a rapid river in this extempore vessel. Before many days, however, it becomes water-logged, and, losing its stiffness, spreads out flatly almost to the level of the water, so as to be nearly useless as well as dangerous. Pieces of the bark are sometimes used for covering the roofs of houses.

A. nigra, black spruce, falls little short in its northern range of the preceding, but in the higher latitudes it is a much inferior tree in numbers, beauty, and utility, and is almost confined to swamps and bogs.

According to Emerson, it is in perfection in the northern parts of Maine, or about the 46th parallel, and is less flourishing in more southern localities. It is found on the higher mountains of North Carolina and Tennessee. Up to the Saskatchewan it retains a vigorous growth, beyond which it becomes visibly inferior to the white spruce, its branches being short, irregular, and overgrown with usneæ and other parasitic lichens. *A. mertensiana* and *A. sitchensis* grow in the forests of Norfolk Sound on the north-west coast in lat. 57°; Mr. Seeman found the latter extending northwards to the coasts of Beering's Sea; and a spruce which grows on the banks of the Niatok or Buckland River is thought by Sir William J. Hooker to be one of these Sitka species, and decidedly different from *A. alba*, to which Mr. Seeman at first referred it.

Larix americana, American larch, tamarack or hackmatack, *L'epinette rouge* of the voyagers, and the *Wagginā-gan* or "tree that bends" of the Crees, ranges northwards to the arctic circle, and from Newfoundland and Labrador across the continent to the Pacific. It grows in the swamps of the Northern States, and extends southwards to Virginia, where it is confined to the mountains. In high latitudes this tree yields a very heavy wood, so much twisted in the grain as not to be readily worked, but it is tough and very durable. It is a tree of no great importance, and is generally thinly scattered through the forest, and if it is any where grouped in numbers it is on the borders of swamps, where it never attains much height.

Cupressus thyoides, white or sweet cedar, extends from North Carolina to the south side of the Saskatchewan basin. Clumps of it grow on the west side of Rainy Lake, and solitary trees range northwards to the vicinity of Cumberland House in latitude 54°, where a specimen was gathered by Mr. Drummond. *C. nutkatensis* vel *Thuja excelsa* inhabits the Pacific coast from Norfolk Sound down to Observatory Inlet and Vancouver's Island. *Thuja occidentalis*, American arbor vitæ, also called white cedar, has its northern limit on the east side of the Rocky Mountains at *Lac Bourbon* or Cedar Lake, a dilatation of the Saskatchewan lying between the 53rd and 54th parallels. Michaux mentions the mountains of Virginia as its southern limit. It is a handsome ornament to the banks of Rainy River and the River Winipeg, where it overhangs the water in a picturesque manner; but, as it commonly grows on the occasionally inundated points of lakes and in swamps unmixed

with other trees, it has a sombre aspect; and its stems are generally inclined, crooked, and even contracted. *T. gigantea*, the *Wyeth* of the Wallamet Indians, grows in the valley of Oregon from the Rocky Mountains to the sea, and northwards to Vancouver's Island. Mr. Douglas found it growing to the height of 170 feet, with a trunk 40 feet in circumference.

Juniperus communis extends from the vicinity of the Arctic Sea to the New England States and Newfoundland. It produces berries freely on elevated grounds within the arctic circle. *J. prostrata* (Persoon), *repens*, vel *humilis aliorum*, is considered by Sir William Hooker to be a variety of *J. sabina*, which includes the *J. virginiana*. It has always the prostrate form in Rupert's Land, and was observed within the arctic circle, 1,000 feet above the sea, associated with the preceding, and bearing fruit. Dr. Gray informs me, that it is not found in this prostrate flagelliform condition south of New York and Northern Pennsylvania. The ordinary *J. virginiana*, red cedar or savin, ranges to the furthest limits of Texas, and to the country about Santa Fé and Tampas Creek, which is elevated from 3,000 to 5,000 feet above the sea. Col. Emory found it on the 35th parallel, at an altitude of from 6,000 to 7,000 feet, in form of a large tree. *Taxus canadensis*, American yew or ground hemlock, grows in Massachusetts and Newfoundland, and on the borders of the great lakes northwards to the southern slope of the Saskatchewan basin. It is a very pleasing underwood, with an almost herbaceous aspect, which grows thickly under the shade of many kinds of trees. On the canoe route it never assumes the tree form; but in the valley of Oregon Mr. Douglas found yew trees as large as those of Europe.

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[90] I am indebted to Dr. Asa Gray for some valuable information respecting the range in the United States of some of the trees in the following list. The *Northern States* referred to in the list extend from New England to Wisconsin, and south to Ohio and Pennsylvania, inclusive.

The following table is founded on Sir William J. Hooker's *Flora*

Boreali-Americana. Since the publication of that work, Sir George Back's voyage down the Thlewee-choh, Messrs. Dease and Simpson's through the Arctic Sea, Mr. Rae's from York Factory to Repulse Bay, the voyage detailed in the preceding pages, a list of Nova Scotia plants contributed by Mr. Dawson of Pictou, a collection of plants gathered by Mr. Campbell at Pelly Banks, and Dr. Asa Gray's important Botany of the Northern States, have contributed to our knowledge of the distribution of species, and have been severally had recourse to.

The first zone extends on the eastern side of the continent from latitude 45° to 55°, or it comprehends the St. Lawrence and Saskatchewan basins: it rises obliquely, in accordance with the course of the isothermal lines, in going westward, and on the Pacific coast it includes the 49th and 58th parallels, or Vancouver's and Sitka Islands. It is subdivided into three districts; viz., the eastern forest country, the eastern prairies, and the country west of the crest of the Rocky Mountains.

The second zone comprehends all the country lying between the arctic circle and the extremities of the continent in latitude 72°. It was not found practicable, owing to the way in which the herbaria were formed, to separate the barren ground species from those growing in the woody country, and the zone has been made to include three districts, one of which is Kotzebue Sound, where 273 species have been collected by Chamisso and others.[91]

The Rocky Mountain ridge, between the 52nd and 57th parallels, has been made a second district of this zone, as many arctic species go southwards along the elevated crest of the ridge. I have not been able, however, to separate the species collected by Drummond in the lower valleys of the ridge from those gathered high up on the peaks. From the untiring diligence and unrivalled quickness of eye of this celebrated collector, we may consider the district as well explored; and had the vertical ranges of the species been noted, there would be nothing more required for the present investigation.

The third district of the zone comprises the entire arctic country, from Barrow's Point to Davis' Straits.

The third zone lies to the north of the 73rd parallel, and extends from Melville Island to Spitzbergen, including a few species gathered above that parallel in Baffin's Bay, and some collected by Dr. Scoresby on the

east coast of Greenland. No American land to the westward of Melville Island in so high a latitude has been discovered; and I have met with no flora of the polar Asiatic islands; but it is probable that, so far north, a nearly uniform vegetation encircles the earth.

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[91] Mr. Seeman, who was employed as botanist in the Herald's late voyages to that quarter, has made a much more ample herbarium of the north-west coast; but as he has just arrived in England as these pages are passing through the press, I can avail myself only partially of his researches for the improvement of the table.

Statistical Enumeration of the Numbers of Species by their Families and Genera in different Zones.

Key:

Tot — Total Species in Three Zones.

First Zone.
Between Latitude 45° to 55° on East side and Latitude 49° to 58° on West side.
S1—Species in First Zone.
PC—On Pacific Coast.
EP—On Eastern Prairies.
WD—In Eastern Woody District

Second Zone.
From Arctic Circle northwards to 72° N.
S2—Species in Second Zone.
KS—Kotzebue Sound.
RM—Rocky Mountains, 52° to 57°.
EA—Eastern Arctic District.

Third or Polar Zone.
Lying North of 73° Latitude.
S3—Species in Third Zone.
LS—Lancaster Sound, &c.
NG—North Greenland.
SP—Spitzbergen.

EAA — Europe, Asia, and Africa.

Families.		First Zone				Second Zone				Third Zone				
	Tot	S1	PC	EP	WD	S2	KS	RM	EA	S3	LS	NG	SP	EAA
DICOTYLEDONEÆ	1718	1499	498	391	1130	551	230	340	376	70	57	40	29	403
I. RANUNCULACEÆ	72	59	24	19	47	42	12	31	23	5	5	1	1	22
Clematis	3	3	3	1	1	1		1						
Thalictrum	5	4	2	2	3	2	1		2					1
Anemone	11	9	4	4	8	8	2	7	4					6
Hepatica	1	1	1	1	1									1
Hydrastis	1	1			1									
Adonis	1	1			1									
Ranunculus	30	23	6	8	20	21	7	17	13	4	4	1	1	13
Caltha	4	3	2	2	2	4		3	2	1	1			1
Trollius	1					1		1						
Isopyrum	1	1			1									
Coptis	2	2	2		1									
Aquilegia	2	2	1		2	2			2					
Delphinium	3	2	1		1	2	1	1						
Aconitum	2	2	1		1	1	1	1						
Actæa	2	2		1	2									
Cimicifuga	1	1			1									
Hydrastis	1	1			1									
Pæonia brownii	1	1	1											
II. MENISPERMACEÆ	1	1			1									
Menispermum	1	1			1									
III. BERBERIDEÆ	5	5	3	1	2									
Berberis	3	3	2	1	1									1
Leontice	1	1			1									
Epimedium	1	1	1											
IV. PODOPHYLLEÆ	3	3			3									
Jeffersonia	1	1			1									
Podophyllum	1	1			1									
Hydropeltis	1	1			1									
V. NYMPHÆACEÆ	4	4	1		4									1
Nymphæa	1	1			1									
Nuphar	2	2	1		2									1
Nelumbium	1	1			1									

VI. Sarracenieæ	1	1		1	1	1		1	1					
Sarracenia	1	1		1	1	1		1	1					
VII. Papaveraceæ	3	2			2	1	1	1	1	1	1	1	1	1
Papaver	1					1	1	1	1	1	1	1	1	1
Stylophorum	1	1			1									
Sanguinaria	1	1			1									
VIII. Fumariaceæ	9	7	3	1	5	4	2	1	2					2
Dielytra	4	3	3	1	1	1	1							
Adlumia	1	1			1									
Corydalis	3	2			2	3	1	1	2					1
Fumaria	1	1			1									1
IX. Cruciferæ	104	65	31	21	48	66	16	34	53	16	14	7	5	50
Cheiranthus	1	1	1											
Nasturtium	4	4	2	1	3	1	1	1	1					3
Barbarea	3	3	2	2	2	1		1	1					2
Turritis	7	5	2	3	4	6		5	5					1
Arabis	7	7	3	2	6	2	1	2	2					4
Cardamine	7	5	2	2	5	6	4	3	5	1	1	1	1	4
Dentaria	2	2			2									
Parrya	2					2	1		2	1	1		1	1
Vesicaria	3	3	1	3	1	2		2	1					
Draba	25	8	5	1	5	22	5	9	16	7	6	2	2	15
Erophila	1	1	1		1									1
Cochlearia	8	4	3		1	3	1		3	4	3	3		4
Thlaspi	3	3			3	1			1					3
Hutchinsia	1					1	1	1						1
Cakile	1	1			1									
Hesperis	2	1			1	1	1							2
Sisymbrium	10	9	6	5	7	7	1	5	7					3
Camelina	2	1			1	1								2
Braya	4					4		1	4					
Platypetalum	2					1		1	1	2	2	1	1	
Eutrema	2					2			2	1	1			
Oreas	1	1	1											
Sinapis	2	2			2									2
Lepidium	3	3	2	2	2	2		2	1					1
Capsella	1	1			1	1		1	1					1

X. Capparideæ	2	2	2											
Cleome	1	1	1											
Polanisia	1	1	1											
XI. Cistineæ	5	5			5									
Helianthemum	1	1			1									
Lechea	3	3			3									
Hudsonia	1	1			1									
XII. Violarieæ	18	18	4	5	15	2		2	2					1
Viola	18	18	4	5	15	2		2	2					1
XIII. Droseraceæ	9	7	3	3	6	6	3	6	3					4
Drosera	4	4	2	2	4	2	1	2	1					3
Parnassia	5	3	1	1	2	4	2	4	2					1
XIV. Polygaleæ	7	7			7	1			1					
Polygala	7	7			7	1			1					
XV. Caryophylleæ	66	48	26	13	33	35	15	19	25	11	7	7	7	29
Dianthus	1					1	1							1
Saponaria	1	1			1									1
Silene	10	10	3	1	7	2	1	1	2	1	1	1	1	3
Lychnis	3	2			2	1	1	1	1	2	1	2	1	2
Agrostemma	1	1			1									1
Mollugo	1	1	1		1									
Spergula	4	3	2	2	2	3	1	2	1	1			1	4
Larbræa	1	1	1			1		1	1					1
Stellaria	14	10	7	3	5	9	4	5	8	3	1	2	2	3
Arenariæ	19	11	7	5	9	13	4	6	11	3	3	1	1	9
Merckia	1					1	1							
Cerastium	10	8	5	2	5	4	2	3	1	1	1	1	1	4
XVI. Lineæ	3	3	1	2	3	1	1	1	1					1
Linum	3	3	1	2	3	1	1	1	1					1
XVII. Malvaceæ	5	5	1	2	3									1
Malva	3	3	1	1	2									1
Hibiscus	1	1			1									
Sida	1	1		1										

XVIII. Tiliaceæ	2	2			2										
Tilia	2	2			2										
XIX. Hypericineæ	8	8			8									1	
Hypericum	8	8			8									1	
XX. Acerineæ	8	8	2	1	6										
Acer	7	7	2		5										
Negundo	1	1		1	1										
XXI. Ampelideæ	4	4			4										
Ampelopsis	1	1			1										
Vitis	3	3			3										
XXII. Geraniaceæ	6	6	3	1	3									4	
Geranium	5	5	2	1	3									3	
Erodium	1	1	1											1	
XXIII. Balsamineæ	2	2	1		2	1		1	1						
Impatiens	2	2	1		2	1		1	1						
XXIV. Limnanthaceæ	1	1			1										
Floërkia	1	1			1										
XXV. Oxalideæ	5	5	3	1	3									1	
Oxalis	5	5	3	1	3									1	
XXVI. Rutaceæ	4	4			4										
Xanthoxylum	3	3			3										
Ptelea	1	1			1										
XXVII. Celastrineæ	8	8	2	1	7	1		1							
Staphylea	1	1			1										
Euonymus	2	2	1		2										
Celastrus	1	1			1										
Myginda	1	1	1	1		1		1							
Ilex	1	1			1										
Prinos	1	1			1										
Nemopanthes	1	1			1										
XXVIII. Rhamneæ	6	6	3		3										

Rhamnus	2	2	1		1									
Ceanothus	4	4	2		2									
XXIX. Terebinthaceæ	6	6	1		6									
Rhus	6	6	1		6									
XXX. Leguminosæ	98	88	27	34	51	19	11	11	14	2	2	1		19
Thermopsis	2	2	1	1										1
Baptisia	4	4			4									
Medicago	2	2			2									2
Trifolium	7	7	6	2	3									3
Psoralea	5	5	3	3										
Petalostemum	2	2		2	2									
Glycirrhiza	1	1	1	1	1									
Tephrosia	1	1			1									
Amorpha	3	3		3	2									
Robinia	1	1			1									1
Phaca	12	10	2	7	2	4	2	2	4	1	1			2
Oxytropis	9	4		4	2	6	4	4	4	1	1	1		5
Astragalus	12	10	4	7	2	2		1	1					2
Desmodium	5	5			5									
Hedysarum	2	1			1	2	1	1	1					
Lespedeza	5	5			5									
Vicia	5	5	3		4	1	1	1	1					2
Ervum	1	1			1									
Lathyrus	7	7	2	3	6	2	1	1	2					1
Amphiearpea	1	1			1									
Apios	1	1			1									
Phaseolus	1	1			1									
Lupinus	6	6	5	1	1	2	2	1	1					
Gymnocladus	1	1			1									
Cassia	1	1			1									
Cercis	1	1			1									
XXXI. Rosaceæ	124	106	37	33	78	43	20	25	27	5	4	4	1	19
Cerasus	8	8	1	4	8	1			1					
Prunus	1	1			1									
Purshia	1	1	1											
Lütkea	1	1	1											
Spiræa	8	8	6	3	3	2	1	1						1

Gillenia	1	1			1									
Dryas	3	2	1	1	2	3	2	2	3	1	1	1	1	1
Geum	4	4	1	2	3	1		1						1
Sieversia	5	2	1	1	1	3	3		1	1	1			
Comaropsis	2	2	1		1									1
Rubus	18	16	8	3	12	5	3	3	4					2
Dalibarda	1	1			1									
Fragaria	3	3	1		2	1		1	1					
Potentilla	36	24	6	14	16	19	10	13	12	3	2	3		7
Sibbaldia	1	1			1	1		1						
Chamærhodos	1	1		1		1		1						1
Agrimonia	1	1			1									1
Alchemilla	1	1			1									1
Sanguisorba	2	2	2		2	1	1		1					
Poterium	1	1			1									1
Rosa	9	9	1	2	8	3		1	3					2
Cratægus	8	8	1	2	8	1		1						
Amelanchier	2	2	1		2	1			1					
Pyrus	6	6	4		3									
XXXII. Onagrariæ	28	25	9	11	11	7	5	6	4	2	1	2		10
Epilobium	12	9	5	2	4	7	5	6	4	2	1	2		6
Gaura	4	4		4										
Œnothera	7	7	2	5	3									1
Clarkia	1	1	1											
Isnardia	2	2			2									1
Circæa	2	2	1		2									2
XXXIII. Haloragia	10	8	2	4	7	5	3	2	4					5
Proserpinaca	1	1			1									
Myriophyllum	3	3		1	3	2			1	2				2
Callitriche	3	3	1	2	2									2
Hippuris	3	1	1	1	1	3	3	1	2					1
XXXIV. Ceratophylleæ	1	1		1	1	1		1	1					1
Ceratophyllum	1	1		1	1									1
XXXV. Lythrariæ	3	3			5									1
Lythrum	2	2			2									1
Decodon	1	1			1									

XXXVI. Cucurbitaceæ	2	2		1	2									
Sicyos	1	1			1									
Echinocistus	1	1		1	1									
XXXVII. Portulaceæ	13	11	9	1	3	3	3	1						1
Montia	1	1	1											1
Portulaca	1	1			1									
Lewisia	1	1	1											
Talinum	1	1			1									
Claytonia	9	7	7	1	1	3	3	1						
XXXVIII. Paronychieæ	2	2		1	1									
Anychia	1	1			1									
Paronychia	1	1		1										
XXXIX. Crassulaceæ	3	3		1	2	1	1		1					1
Sedum	2	2		1	1	1	1		1					1
Penthorum	1	1			1									
XL. Cacteæ	2	2	1	1	1									
Cactus	2	2	1	1	1									
XLI. Grossularieæ	16	16	8	3	10	4	1	2	4					1
Ribes	16	16	8	3	10	4	1	2	4					1
XLII. Saxifrageæ	56	32	13	4	19	35	23	21	18	12	11	7	7	18
Heuchera	6	6	3	1	3	1		1	1					
Tiarella	3	3	2		1									
Tellima	1	1	1											
Mitella	4	3		1	2		3		3	1				
Chrysosplenium	2	1			1	1	1	1	1	1	1			1
Saxifraga	38	17	7	2	11	28	20	15	15	11	10	7	7	17
Eriogyna	1	1			1	1	1	1						
Leptarrhena	1					1	1							
XLIII. Umbelliferæ	39	36	13	6	29	10	6	2	5					10
Hydrocotyle	2	2			2									1
Eryngium	1	1			1									
Sanicula	1	1	1		1									
Cicuta	3	3	1		3	2		1		2				1
Zizia	3	3		1	3	1		1	1					

Ammi	1	1			1								
Carum	1	1			1								1
Cryptotænia	1	1			1								
Sium	2	2	2	1	2								1
Bupleurum	2	1			1	1	1						1
Seseli	1	1		1		1			1				
Cnidium	1	1			1								
Thaspium	1	1			1								
Ligusticum	1	1	1		1	1	1						1
Conioselinum	2	2	1		1	1	1		1				1
Angelica	2	2			2								
Archangelica	1					2	2						1
Pleurospermum	1	1	1										
Færula	2	2	1	2									
Imperatoria	1	1			1								1
Pastinaca	1	1	1		1								1
Heracleum	1	1	1		1								
Laserpitium	1					1	1						
Polytænia	1	1		1									
Daucus	1	1	1										
Osmorrhiza	2	2	2		2								
Conium	1	1			1								
Erigeneia	1	1			1								
XLIV. Araliaceæ	7	7	1	1	6	1		1	1				1
Adoxa	1	1			1	1		1	1				1
Panax	3	3	1	1	2								
Aralia	3	3			3								
XLV. Hamamelideæ	1	1			1								
Hamamelis	1	1			1								
XLVI. Corneæ	7	7	4	2	7	2	2	1	1				1
Cornus	7	7	4	2	7	2	2	1	1				1
XLVII. Loranthaceæ	1	1	1		1	1	1	1					1
Arceuthobium	1	1	1		1	1	1	1					1
XLVIII. Caprifoliaceæ	24	24	7	4	23	6	2	6	3				2
Sambucus	2	2	1	1	2								
Viburnum	9	9	2	2	9	1		1	1				

Diervilla	1	1			1	1		1						
Lonicera	8	8	1		7	3	1	3	1					1
Triosteum	1	1			1									
Symphoricarpus	2	2	2		2									
Linnæa	1	1	1	1	1	1	1	1	1					1
XLIX. RUBIACEÆ	15	15	5	2	14	3	3	2	2					2
Hedyotis	3	3			3									
Mitchella	1	1			1									
Cephalanthus	1	1			1									
Galium	9	9	5	2	8	3	3	2	2					2
Spigelia	1	1			1									
L. VALERIANEÆ	6	5	2	1	3	3	1	2	1					1
Valeriana	5	4	2	1	2	3	1	2	1					1
Fedia	1	1			1									
LI. COMPOSITÆ	321	285	66	80	218	85	31	60	57	7	6	3	1	46
1. *Cichoraceæ*	41	36	7	9	31	11	2	10	6	1	1	1	1	12
Sonchus	7	6	3	2	5	1		1	1					4
Nabalus	6	6	1		5									
Lygodesma	2	1			1	1		1						
Leontodon	2	2	2	2	2	2	2	2	2	1	1	1	1	2
Apargia	2	2	1		1									1
Cynthia	1	1			1									
Lapsana	1	1			1									1
Cichorium	1	1			1									1
Crepis	3	3		1	2	2		2	1					1
Hieracium	12	10		3	10	3		2	1					2
Troximon	3	2		1	1	2		2	1					
Krigia	1	1			1									
2. *Cynareæ*	13	10	1	1	10	5	1	4	2					5
Centaurea	1	1			1									1
Arctium	1	1			1									1
Carduus	6	5	1	1	5	3		3						2
Cirsium	3	3			3									
Saussurea	2				2	1	1	2						1
3. *Vernoniaceæ*	2	2		1	2									

Vernonia	2	2		1	2									
4. *Eupatoriaceæ*	15	14	2	4	14	4	2	2	3	2	2			2
Kuhnia	1	1			1									
Eupatorium	4	4			4									1
Mikania	1	1			1									
Liatris	5	5		2	5									
Nardosmia	3	2	1	1	2	3	1	1	3	2	2			1
Adenocaulon	1	1	1	1	1	1	1	1						
5. *Senecionideæ*	116	104	36	29	74	35	21	24	25	4	3	2		23
Silphium	6	6		1	6									
Xanthium	2	2			2									
Ambrosia	5	5	2	1	4									
Parthenium	1	1			1									
Iva	1	1	1	1										
Heliopsis	1	1		1	1									
Echinacea	1	1			1									
Rudbeckia	3	3		2	2									
Lepachys	1	1			1									
Coreopsis	3	3			3									
Helianthus	12	12	2	3	9									
Bideus	6	6	1		6									
Gaillardia	2	2	2	2	1									
Trichophyllum	2	2	2											
Hymenopappus	1	1	1											
Picradenia	1	1		1										
Helenium	1	1	1	1	1	1	1	1	1					
Anthemis	1	1			1									1
Marruta	1	1			1									
Achillea	3	3	2	1	2	2	1	2	2					1
Chrysanthemum	4	3	2		1	3	3	1	2	1	1			2
Pyrethrum	1	1			1	1	1	1	1					1
Cotula	1	1	1											1
Omalanthus	1	1	1		1	1			1					
Tanacetum	3	3	1		2									1
Artemisia	17	12	6	8	5	11	7	7	8					5
Gnaphalium	6	6	1		5									4
Antennaria	6	5	3	3	5	4	1	4	2	1	1	1		4
Arnica	5	4	4			3	1	3	1	1	1	1		1

Senecio	16	12	3	3	10	9	6	5	7	1				2
Cacalia	2	2		1	2									
6. *Asteroideæ*	134	119	20	36	87	30	5	20	21					4
Solidago	31	31	4	5	30	3	1	3	2					1
Aster	59	49	7	10	37	11	3	5	9					1
Eurybia	2	2			2									
Seriocarpus	1	1			1									
Tripolium	2	2		2		1			1					
Galatella	2	2			2									
Townsendia	1	1		1		1		1						
Erigeron	17	12	6	6	9	12	1	10	8					2
Dipplopappus	9	9	1	6	4									
Boltonia	1	1			1									
Brachyris	1	1		1										
Polymnia	1	1			1									
Madia	1	1		1										
Crinitaria	2	2	1	1										
Donia	4	4	1	3		2		1	1					
LII. CAMPANULACEÆ	14	11	3	1	9	4	3	2	2	1		1	1	3
Campanula	8	5	3	1	3	4	3	2	2	1		1	1	2
Lobelia	6	6			6									1
LIII. VACCINEÆ	16	16	13	5	10	6	2	5	4					
Vaccinium	16	16	13	5	10	6	2	5	4					4
LIV. ERICEÆ	40	33	19	3	23	18	8	13	10	2	1	1	2	10
Gaultheria	4	3	2	1	2	2		2						
Arbutus	4	4	3	1	2	2	2	2	2					2
Andromeda	10	9	6	1	6	4	2	2	3	2	1	1	2	2
Menziesia	8	4	3		1	4		4						1
Kalmia	3	3	1		3	1		1	1					
Epigæa	1	1			1									
Rhodora	1	1			1									
Rhododendron	6	5	1		4	2	1	2	1					2
Azalea	1	1	1		1	1	1		1					1
Ledum	2	2	2		2	2	2		2					2
LV. MONOTROPEÆ	16	15	8	4	10	6	2	5	5					5
Cladothamnus	1	1	1											

Pyrola	10	9	6	3	5	6	2	5	5					5
Pterospora	1	1			1									
Monotropa	2	2			2									
Chimaphila	2	2	1	1	2									
LVI. JASMINEÆ	3	3	1	1	3									
Fraxinus	3	3	1	1	3									
LVII. APOCYNEÆ	4	4		1	3									1
Apocynum	4	4		1	3									1
LVIII. ASCLEPIADEÆ	11	11		2	11								1	
Asclepias	11	11		2	11								1	
LIX. GENTIANEÆ	34	27	10	2	19	13	8	9	8					5
Gentiana	23	16	6		11	10	6	7	6					2
Pleurogyne	1	1			1	1	1		1					1
Swertia	1	1	1											1
Halenia	3	3		1	3	1		1						
Sabattia	2	2		2										
Menyanthes	1	1	1	1	1	1	1	1	1					1
Villarsia	2	2	2											
Limnanthemum	1	1			1									
LX. POLEMONIACEÆ	13	11	4	2	8	4	2	2	2	1		1	2	
Polemonium	2	2		1	2	1	1	1	1	1		1	1	
Phlox	9	7	2		5	3	1	1	1				1	
Collomia	2	2	2	1	1									
LXI. DIAPENSIACEÆ	1					1			1				1	
Diapensia	1					1			1				1	
LXII. CONVOLVULACEÆ	6	6	2	2	6								2	
Convolvulus	2	2			2								1	
Calystegia	2	2			2								1	
Cuscuta	2	2	2	2	2									
LXIII. HYDROPHYLLEÆ	5	4		1	4	2	1	2	1					
Hydrophyllum	3	3			3									
Eutoca	2	1		1	1	2	1	2	1					

LXIV. Boragineæ	27	25	7	6	20	9	4	5	6					6	
Myosotis	4	3	2	1	1	1	1	1	1					3	
Echinospermum	7	7		1	7	2		1	1					2	
Lithospermum	14	13	4	3	11	6	3	3	4					1	
Onosmodium	1	1		1	1										
Echium	1	1	1												
LXV. Solaneæ	8	8	4	2	3										
Solanum	2	2		1	1										
Datura	1	1			1										
Nicandra	1	1			1										
Nicotiana	2	2	2												
Physalis	2	2	2	1											
LXVI. Orobancheæ	6	6	3	3	4	1	1		1					1	
Orobanche	4	4	3	3	2	1	1		1					1	
Conophilus	1	1			1										
Epiphegus	1	1			1										
LXVII. Acanthaceæ	2	2			2										
Dipteracanthus	1	1			1										
Dianthera	1	1			1										
LXVIII. Scrophularineæ	74	69	27	22	46	20	10	13	14	2	2	1	1	21	
Verbascum	3	3			3									2	
Linaria	2	2			2									1	
Collinsia	4	4		1	3										
Chelone	1	1			1										
Penstemon	8	8	5	4	1									1	
Mimulus	4	4	2	1	2										
Gratiola	1	1	1	1	1										
Synthyris	1	1			1										
Limosella	1	1			1									1	
Veronica	11	11	6	4	8	3	1	3	1					6	
Gymnandra	2	1	1			1	1		1						
Romanzoffia	2	2	2			1	1								
Gerardia	6	6		1	6										
Orthocarpus	3	3	3	1	1										
Castilleja	5	5	3	3	4	3	2	3	3						
Euphrasia	1	1			1									1	

Bartsia	1	1			1									1
Rhinanthus	1	1	1	1	1	1		1	1					1
Melampyrum	1	1		1	1									1
Pedicularis	16	12	3	4	8	11	5	6	8	2	2	1	1	6
LXIX. Labiatæ	40	40	8	10	37	2		2	2					8
Mentha	1	1	1	1	1									
Lycopus	4	4	1	2	2									
Salvia	1	1			1									
Monarda	3	3			3									
Blephila	1	1			1									
Pycnanthemum	3	3			3									
Collinsonia	1	1			1									
Cunila	1	1			1									
Hedeoma	1	1			1									
Micromeria	1	1			1									
Melissa	1	1			1									
Prunella	1	1	1	1	1									1
Scutellaria	6	6	3	2	5									1
Lophanthus	3	3		1	3									
Nepeta	1	1			1									1
Dracocephalum	1	1		1	1	1		1	1					
Physostegia	1	1	1	1	1									
Lamium	1	1			1									1
Leonurus	1	1			1									1
Galeopsis	1	1			1									1
Stachys	3	3	1	1	3	1		1	1					1
Marrubium	1	1			1									1
Teucrium	1	1			1									
Trichostema	1	1			1									
LXX. Verbenaceæ	15	15	5	5	13	4		4	2					6
Verbena	6	6	2	2	5									1
Phryma	1	1			1									
Utricularia	6	6	1	1	6	2		2	1					3
Pinguicula	2	2	2	2	1	2		2	1					2
LXXI. Primulaceæ	23	17	9	7	13	11	7	4	8					10
Dodecatheon	2	2	2	1	1	2	2		1					
Androsace	2					2	2	2	2					2

Douglasia	2	1		1		1			1					
Primula	6	3	1	1	3	5	3	2	3					4
Trientalis	3	3	2		1									1
Lysimachia	6	6	2	2	6	1			1					1
Glaux	1	1	1	1	1									1
Samolus	1	1	1	1	1									1
LXXII. Plumbagineæ	2	2	1		2	1	1		1					1
Statice	2	2	1		2	1	1		1					1
LXXIII. Plantagineæ	5	5	3	1	4	2			2					3
Plantago	5	5	3	1	4	2			2					3
LXXIV. Nyctagineæ	3	3	1		2									
Oxybaphus	1	1	1											
Allionia	2	2			2									
LXXV. Amaranthaceæ	6	6	1	2	6									
Amaranthus	6	6	1	2	6									
LXXVI. Chenopodeæ	20	19	6	11	12	4	3		1					14
Salicornia	2	2	1	1	1									2
Salsola	1	1			1									1
Corispermum	1	1	1	1	1									1
Eurotia	1	1		1										1
Blitum	2	2		1	1									1
Chenopodium	8	7	3	6	4	1			1					5
Ambrina	1	1			1									
Atriplex	4	4	1	1	3	3	3							3
LXXVI I. Phytolaceæ	1	1			1									
Phytolacca	1	1			1									
LXXVIII. Polygoneæ	34	32	16	8	22	11	6	6	9	2	2	2	2	17
Konigia	1				1	1	1	1						1
Oxyria	1	1	1			1	1	1	1	1	1	1	1	1
Rumex	10	10	5	4	9	5	1	2	4					8
Polygonum	18	17	7	2	13	4	3	1	4	1	1	1	1	7
Eriogonum	4	4	3	2										
LXXIX. Laurineæ	2	2			2									

Benzoin	1	1			1									
Sassafras	1	1			1									
LXXX. Eleagneæ	3	3		2	2	2		2	2					
Eleagnus	1	1		1	1	1		1	1					
Shepherdia	2	2		1	1	1		1	1					
LXXXI. Thymeleæ	1	1			1									
Dirca	1	1			1									
LXXXII. Santalaceæ	2	2		2	2	1		1	1					
Comandra	2			2	2	1		1	1					
LXXXIII. Aristolochiæ	1	1			1									
Asarum	1	1			1									
LXXXIV. Empetreæ	1	1			1	1	1	1	1					1
Empetrum	1	1			1	1	1	1	1					1
LXXXV. Euphorbiaceæ	8	8	2	2	8									1
Euphorbia	7	7	2	2	7									1
Acalypha	1	1			1									
LXXXVI. Urticeæ	10	10	1	1	10	1			1					4
Urtica	5	5	1	1	5	1			1					2
Pilea	1	1			1									
Parictaria	1	1			1									
Boehmeria	1	1			1									
Humulus	1	1			1									1
Cannabis	1	1			1									1
LXXXVII. Ulmaceæ	3	3	1		3									
Ulmus	2	2			2									
Celtis	1	1	1		1									
LXXXVIII. Saurureæ	1	1			1									
Saururus	1	1			1									
LXXXIX. Juglandineæ	4	4			4									
Juglans	2	2			2									
Carya	2	2			2									

XC. Salicaceæ	48	39	8	6	36	27	8	14	24	3	1	3	1	14
Salix	44	35	7	5	32	25	7	12	22	3	1	3	1	13
Populus	4	4	1	1	4	2	1	2	2					1
XCI. Betulaceæ	11	11	4	4	9	6	3	6	5					2
Betula	8	8	2	2	7	4	1	4	3					1
Alnus	3	3	2	2	2	2	2	2	2					1
XCII. Platanaceæ	1	1			1									
Platanus	1	1			1									
XCIII. Cupuliferæ	15	15	2	2	14									
Quercus	10	10	1		9									
Fagus	1	1			1									
Carpinus	1	1			1									
Ostrya	1	1			1									
Corylus	2	2	1	2	2									
XCIV. Myricaceæ	3	3	2	1	2	1		1	1					1
Myrica	2	2	2	1	1	1		1	1					1
Comptonia	1	1			1									
XCV. Coniferæ	20	20	9	6	14	7	1	4	6					2
Pinus	5	5	2	1	4	1			1					
Abies	6	6	3	2	4	3	1	2	2					
Larix	1	1			1	1			1					
Cupressus	2	2	1		1									
Thuja	2	2	1	1	1									
Juniperus	3	3	2	2	2	2		2	2					2
Taxus	1	1			1									
MONOCOTYLEDONES	554	493	162	122	399	198	53	120	146	21	20	9	9	188
XCVI. Comelineæ	1	1			1									
Tradescantia	1	1			1									
XCVII. Alismaceæ	3	3	2	2	3									3
Sagittaria	1	1	1	1	1									1
Alisma	2	2	1	1	2									2
XCVIII. Juncagineæ	4	4	1	3	4	2		2	1					3

Scheuchzeria	1	1		1	1	1		1					1
Triglochin	3	3	1	2	3	1		1	1				2
XCIX. Aroideæ	13	12	2	3	11	3	1	3	2				10
Acorus	1	1		1	1								1
Orontium	1	1			1								
Arum	1	1			1								
Calla	1	1			1								
Symplocarpus	2	2	2		1								2
Lemna	3	3			3								3
Sparganium	3	2		1	2	2	1	2	2				3
Typha	1	1		1	1	1		1	1				1
C. Naiades	14	14	3		14	1		1	1				9
Zannichellia	1	1	1		1								1
Naias	1	1			1								
Ruppia	1	1	1		1								1
Potamogeton	11	11	1		11	1	1	1			7		
CI. Smilaceæ	19	19	6	8	16	3		3	2				4
Smilax	3	3		1	3								
Streptopus	3	3	3	2	2								2
Uvularia	6	6	1	1	5								
Smilacina	6	6	2	4	5	3		3	2				1
Polygonatum	1	1			1								1
CII. Melanthaceæ	16	16	7	4	13	4	2	3	3				3
Limnanthemum	1	1			1								
Zigadenus	1	1	1	1	1	1	1	1	1				
Xerophyllum	1	1	1										
Helonias	1	1	1										
Veratrum	1	1	1	1	1	1		1					
Tofieldia	3	3	2	2	3	2	1	1	2				2
Medeola	1	1			1								
Trillium	7	7	1		6								1
CIII. Liliaceæ	9	9	6	1	5								1
Lillum	3	3	2	1	3								
Fritillaria	2	2	2										1
Erythronium	3	3	1		2								

Calochortus	1	1	1											
CIV. Asphodeleæ	12	11	7	3	4	2	1		2					1
Anthericum	1					1	1		1					
Allium	8	8	4	3	4	1			1					1
Camassia	1	1	1											
Brodiæa	2	2	2											
CV. Pontederiaceæ	2	2			2									
Pontederia	1	1			1									
Leptanthus	1	1			1									
CVI. Restiaceæ	1	1			1									
Eriocaulon	1	1			1									1
CVII. Junceæ	23	20	10	9	15	17	8	14	13	3	2	2	2	14
Luzula	7	6	4	2	4	5	4	5	3	2	1	1	2	4
Juncus	16	14	6	7	11	12	4	9	10	1	1	1		10
CVIII. Hydrocharideæ	2	2			2									1
Valisneria	1	1			1									1
Udora	1	1			1									
CIX. Orchideæ	54	52	17	9	43	10	3	8	8					1
Microstylis	3	3	1		2									
Liparis	2	2			2									
Corallorrhiza	3	3	2	1	2	1	1							
Amplectrum	1	1			1									
Calypso	1	1	1	1	1	1		1	1					
Orchis	2	2	1		1									
Gymnadenia	1	1			1									
Platanthera	20	20	7	5	15	3	1	3	3					
Peristylus	2	2	1	1	1									
Arethusa	1	1			1									
Pogonia	2	2			2									
Calopogon	1	1			1									
Spiranthes	3	3	1	1	3	2		2	1					
Goodyera	2	1			1	1	1							
Listera	2	2	2		2									
Cypripedium	8	7	1		7	2	1	1	2					

CX. IRIDEÆ	8	7	2	1	7	3	2		1					
Iris	7	6	1	1	6	2	2							
Sisyrinchium	1	1	1		1	1			1					
CXI. HYPOXIDEÆ	1	1			1									
Hypoxis	1	1			1									
CXII. DIOSCOREÆ	1	1			1									
Dioscorea	1	1			1									
CXIII. CYPERACEÆ	218	184	51	33	160	102	12	54	77	5	5	1	2	81
Carex	183	153	39	24	131	91	9	45	68	3	3	1	2	65
Elyna	2					2		2	1					
Eleocharis	7	6	4	3	5	3		2	2					5
Scirpus	10	10	3	5	10									4
Eriophorum	8	7	4		7	6	3	5	6	2	2			6
Dulichium	1	1			1									
Cyperus	5	5		1	4									
Rhynchospora	2	2	1		2									1
CXIV. GRAMINEÆ	153	134	48	46	96	51	24	32	36	13	13	5	6	56
Leersia	2	2			2									
Hydropyrum	1	1			1									
Alopecurus	4	3	2	1	3	2	1	2	2	1	1	1		3
Phleum	2	2	2	1	1	1		1	1					2
Phalaris	1	1	1	1	1	1			1					1
Hierochloe	3	2		1	2	3	2	2	2	2	2	1	1	2
Anthoxanthum	1	1			1									1
Milium	1	1			1									1
Panicum	8	8	1	3	8									
Holcus	1	1			1									1
Oplismenus	1	1	1	1	1									1
Setaria	1	1			1									
Cenchrus	1	1			1									
Oryzopsis	3	3		2	3									
Stipa	4	4		3	1									
Muhlenbergia	6	6	2	1	5									
Phippsia	2					2	2			1	1		1	1
Colpodium	3	1			1	2	2	1	2	1	1			
Vilfa	1	1		1										

Agrostis	6	6	6	2	3	3		3	1					4
Calamagrostis	10	9	3	2	7	3	2	3	3					2
Ammophila	1	1			1									1
Graphephorum	1	1			1									
Phragmites	1	1	1	1	1									1
Spartina	1	1			1	1			1					
Eutriana	1	1		1		1		1						
Deschampsia	2	1	1	1	1	1	1		1	1	1			1
Dupontia	1	1			1	1	1		1	1	1		1	1
Boutelouia	2	2			2									
Aira	3	2	1		2	1		1		3				1
Trisetum	2	2	1		1	1	1	1	1	1		1		1
Avena	2	1		1	1	2		1	1	1				1
Danthonia	1	1			1									
Poa	26	23	10	6	15	11	7	5	9	3		2	2	13
Eragrostis	1	1			1									
Glyceria	9	8	3	3	5	1			1					2
Pleuropogon	1									1	1			
Reboulea	2	2		1	2	1		1						
Catabrosa	1	1			1									1
Koeleria	1	1	1	1	1									1
Festuca	9	6	2	3	2	5	3	3	4	1	1		1	4
Bromus	3	3	1		2	1	1	1	1					
Ceratochloa	1	1	1											
Brizopyrum	1	1	1	1										
Triticum	3	3	2	2	1	2		2	1					3
Elymus	8	8	3	2	6	3	1	3	2					5
Asprella	1	1			1									
Hordeum	2	2	2	1	1	1			1					1
Andropogon	4	3		3	1	1		1						
ACROGENES	71	67	26	18	57	30	6	21	24					26
CXV. EQUISETACEÆ	9	9	3	2	8	6	2	4	5					8
Equisetum	9	9	3	2	8	6	2	4	5					8
CXVI. FILICES	47	43	16	11	35	20	3	13	16					20
Polypodium	3	3	3		3	3		1	3					3
Woodsia	3	3		1	3	2		1	2					2
Cistopteris	3	2		1	2	2	1	2	1					2
Aspidium	11	10	5	2	9	4	2	3	4					6
Onoclea	1	1			1									

Struthiopteris	1	1			1									
Athyrium	1	1	1	1	1	1		1	1					
Asplenium	7	5			5	2		1	1					3
Blechnum	1	1	1			1			1					1
Pteris	3	3	1	1	3	1			1					1
Cryptogramma	1	1	1	1		1		1	1					
Adiantum	1	1	1		1									
Cheilanthes	1	1	1			1		1						
Dicksonia	1	1			1									
Osmunda	3	3			3									1
Schizæa	1	1			1									
Botrychium	5	5	2	4	1	2		2	1					1
CXVII. Lycopodineæ	12	12	7	5	11	4	2	4	3					7
Lycopodium	11	11	7	5	10	4	2	4	3					7
Selaginella	1	1			1									
CXVIII. Hydropterides	3	3			3									1
Isöetes	1	1			1									1
Salvinia	1	1			1									
Azolla	1	1			1									
Dicotyledones	1725	1499	498	391	1130	568	271	340	377	69	57	40	29	403
Monocotyledones	554	493	162	122	399	198	58	120	146	21	20	9	9	188
Acrogenes	2279	1992	660	513	1529	766	324	460	523	90	77	49	38	591
	71	67	26	18	57	30	6	21	24					26

Obs. In the preceding table, and in that which follows, species that range to several zones are enumerated in each. The proportionate numbers of the second table are found by dividing the whole *Phanerogamæ* of a district by the numbers of each family in that district, and they may, therefore, be considered as denominators of fractions having 1 for a numerator.

The proportions vary remarkably in different districts. The predominance of Compound Flowers, Leguminous and Rosaceous plants in the Prairies, combined with the paucity of Saxifrages, Gentians, and Ericaceous plants, affect the proportions of the other families materially. The Grasses, as might be expected, are more numerous in the Prairies than elsewhere, with the remarkable exception of the Polar Zone, in which the *Gramineæ* form one-seventh of the species, and in

conjunction with the *Cruciferæ, Caryophylleæ*, and *Saxifrageæ*, constitute more than half the *Phanerogamæ*. The small numbers of Asters, Willows, and Carices, on the Pacific coast, modify the numbers of that district.

PROPORTIONATE NUMBERS OF SOME OF THE PRINCIPAL FAMILIES TO THE WHOLE PHANEROGAMOUS VEGETATION OF THE SEVERAL DISTRICTS OF THE THREE ZONES.

Families.	First Zone			Second Zone			
	Pacific Coast	Eastern Prairies	East. Woody Dist.	Kotzebue Sound	Rocky Mts. 52° to 57°	Arctic Region	Polar Zone. North of 73° Lat.
Monocotyledones	4.1	4.2	3.8	6.1	3.8	3.6	4.3
Compositæ	10.0	6.4	7.0	9.0	7.7	25.1	12.9
Cyperacæ	12.9	15.9	9.5	27.0	8.5	6.8	18.2
Gramineæ	13.8	11.2	15.9	13.1	14.4	14.5	7.0
Rosaceæ	17.8	15.6	19.5	12.0	18.4	19.4	18.0
Cruciferæ	21.3	24.4	31.9	17.1	13.9	9.8	6.1
Leguminosæ	24.5	15.1	30.0	23.1	41.8	37.3	45.5
Scrophularineæ	24.4	23.3	32.2	27.0	35.4	37.1	45.5
Caryophylleæ	25.4	39.5	46.3	18.0	24.2	20.9	8.3
Ranunculaceæ	27.5	27.0	32.5	23.1	14.8	22.7	18.2
Ericeæ	34.7	171.0	66.5	36.0	35.4	52.2	45.5
Orchideæ	38.8	57.0	35.6	108.0	57.6	65.3	
Saxifrageæ	50.8	128.2	80.5	12.5	21.9	29.0	7.5
Umbelliferæ	50.8	85.5	54.5	54.0	230.0	104.4	
Gentianeæ	66.0	256.5	80.5	40.5	51.1	65.2	
Coniferæ	73.3	85.5	106.4	324.0	125.0	87.0	
Labiatæ	82.5	51.3	41.3		23.0	26.2	
Salicaceæ	82.5	85.5	42.5	40.5	32.9	21.7	30.3
Borragineæ	94.3	85.5	76.4	64.8	11.5	87.0	

A list of the plants collected by Mr. Seeman on the coasts of Beering's Sea having been received subsequent to the first part of the preceding tables having passed through the press, some emendations are requisite. The numbers of *Dycotyledones*, in p. 342., are to be

substituted for those in p. 322., and the following changes made in the column headed Kotzebue Sound: viz. *Ranunculaceæ*, 14; *Cruciferæ*, 19; *Caryophylleæ*, 18; *Leguminosæ*, 14; *Rosaceæ*, 27; *Portulaceæ*, 5; *Saxifrageæ*, 26; *Compositæ*, 36; *Ericeæ*, 9; *Borragineæ*, 5; *Scrophularineæ*, 12; *Verbenaceæ*, 1; *Diapensiaceæ*, 1. These occasion some slight alterations in the first column of the second zone, and in the total number of plants.

The following Table of the Distribution of the Carices was drawn up by Dr. Boott, whose intimate acquaintance with that genus of *Cyperaceæ* renders it of the highest value to the student of the Geography of Plants:—

London, May 6th, 1850.

My dear Sir John,

I have examined the Carices you brought from your last excursion to America. They are—

C. scirpoidea *Michx*. Arctic Sea coast.
ursina *Dewey*. Arctic Sea coast.
glareosa *Wahlg*. Arctic Sea coast.
stans *Drejer*. Arctic Sea coast.
saxatilis *L*. Arctic Sea coast.
compacta *Brown*. Arctic Sea coast.
fuliginosa *St. & Hoppe*. Arctic Sea coast.
livida *Willd*. Arctic Sea coast.
Novæ Angliæ *Schwz*. Arctic Sea coast and Methy Portage.
canescens *L*. (*& b*.) Arctic Sea coast and Methy Portage.
,, var. polystachya. Lakes Superior, Rainy, and of the Woods.
adusta *Boott*. Methy Portage.
siccata *Dewey*. Methy Portage, Saskatschawan.
lanuginosa *Michx*. Methy Portage, Saskatschawan.
lenticularis *Michx*. Methy Portage.
Houghtonii *Torrey*. Methy Portage.
Raeana *Boott*. Methy Portage.

utriculata *Boott*. Methy Portage, Lakes Superior, Huron.
aquatilis *Wahlg*. Methy Portage, Lakes Superior, Huron, Fort Simpson and Chipewyan.
umbellata *Schk*. Methy Portage, Lakes Superior, Huron, Fort Simpson and Chipewyan.
oligosperma *Michx*. Lake Superior.
aristata *Br*. Lakes Superior and Huron.
scoparia *Schk*. (*& b.*). Lakes Superior and Huron, Winipeg, Athabasca.
vulgaris *Fries*. Lakes Superior and Huron, Winipeg.
retrorsa *Schwz*. Winipeg River, Lake of Woods.
pedunculata *Muhlg*. Winipeg River, Rainy Lake.
intumescens *Rudge*. Lake of Woods, Rainy Lake.
Œderi *Ehrh*. Rainy River and Lake.
Pennsylyanica *Lam*. Saskatschawan, Winipeg, and Cumberland Lakes.
incurva *Light*. Valleys of the Sask. and Mack.

Of the above, C. Raeana is new, and C. stans new to British America.

I find from my notes that the number of Carices in North America is 250; of which 178 are found in all Arctic America, including 97 common to Arctic America and the States, leaving 81 Arctic species.

Of these 81, there are 36 common to Europe, leaving 45 peculiar to Arctic America.

Of the 97 found in Arctic America and the States, 28 are common to Europe, leaving 69 exclusively American.

There are in the States, besides, 72, of which 4 only are European, leaving 68 exclusively American.

The exclusively American species are therefore 182, and 68 common to America and Europe.

American species in Arctic America	45		}
European do.		36	} 81

American species in Arctic America and the States	69		}
European do. do.		28	} 97
American species in the States	68		}
European do.		4	} 72
	182	68	250

You will find that the large proportion of Carices in the Northern part of America, common to it and to Europe, is in accordance with the observations of Agassiz, made in his late interesting excursion to Lake Superior. He remarks that the farther north we proceed the greater is the uniformity of the plants common to the two continents; and it is remarkable that Leconte, in his list of the Coleoptera of Lake Superior, was struck with the absence of all the groups peculiar to the American continent, the large increase of the species of genera feebly represented in the more temperate regions, and the existence of many genera heretofore regarded as confined to the southern parts of Europe and Asia.

Yours sincerely,

F. BOOTT.

The 97 species found in Arctic America and in the States, are—

C. anceps *Muhlg.*
arida *Tor.*
aristata *Brown*.
aurea *Nutt*.
angustata *Boott*.
arctata *Boott*.
adusta *Boott*.
aperta *Boott*.
aquatilis *Wahl.*

C. fulva *Good*.
grisea *Wahlg.*
gracillima *Schwz.*
granularis *Muhlg.*
gynocrates *Worm*.
hystericina *Muhlg.*
intumescens *Rudge*.
irrigua *Willd.*
lupulina *Muhlg.*

C. Richardsoni *Brown*.
retrorsa *Schwz.*
rostrata *Michx*.
retroflexa *Muhlg.*
rigida *Good*.
subulata *Michx*.
squarrosa *L.*
striata *Michx*.
stipata *Muhlg.*

atrata *L.*

blanda *Dewey*.

bromoides *Schk*.

Backii *Boott*.

bullata *Schk*.

Buxbaumii *Wahl.*

cephalophora *Muhlg.*

conoidea *Schk*.

cristata *Schwz.*

crinita *Lam*.

commutata *Gay.*

capillaris *L.*

canescens *L.*

chordorrhiza *Ehrh.*

capitata *L.*

debilis *Michx*.

Deweyana *Schwz.*

digitalis *Willd.*

eburnea *Boott*.

Ehrhartiana *Hoppe*.

festucacea *Schk*.

flexilis *Rudge*.

filiformis *L.*

flava *L.*

lagopodioides *Schk*.

Liddoni *Boott*.

longirostris *Tor.*

lanuginosa *Michx*.

lacustris *Willd.*

lenticularis *Michx*.

limosa *L.*

livida *Willd.*

Muhlenbergii *Schk*.

miliacea *Muhlg.*

monile *Tuckn.*

muricata *L.*

Novæ Angliæ *Schwz.*

oligosperma *Michx*.

Œderi *Ehrh.*

polytrichoides *Muhlg.*

pubescens *Muhlg.*

Pennsylvanica *Lam*.

pedunculata *Muhlg.*

plantaginea *Lam*.

pseudocyperus *L.*

pallescens *L.*

pauciflora *Light*.

rosea *Schk*.

scoparia *Schk*.

straminea *Schk*.

scabrata *Schwz.*

Schweinitzii *Dewey.*

siccata *Dewey*.

scirpoidea *Michx*.

stellulata *Good*.

triceps *Michx*.

tentaculata *Muhlg.*

trisperma *Dewey*.

teretiuscula *Good*.

tenuiflora *Wahl.*

tenella *Schk*.

umbellata *Schk*.

utriculata *Boott*.

varia *Muhlg.*

verticillata *Boott*.

vulpinoidea *Michx*.

vesicaria *L.*

vulgaris *Fries*.

vitilis *Fries*.

Willdenowii *Schk*.

Of the 97 in Arctic America and in the States, 28 are European.

In England.	In Scotland.	In North of Europe.
C. Buxbaumii *Wg.*	C. capillaris *L.*	C. chordorrhiza *Ehrh.*
canescens *L.*	aquatilis *Wahl.*	capitata *L.*
filiformis *L.*	atrata *L.*	gynocrates *Worm.*
flava *L.*	pauciflora *Light.*	tenuiflora *Wahlg.*
fulva *Good.*	rigida *Good.*	livida *Willd.*
irrigua *Willd.*		tenella *Schk.*
limosa *L.*		vitilis *Fries.*
muricata *L.*		Ehrhartiana *Hoppe.*
Œderi *Ehrh.*		
pseudocyperus *L.*		
pallescens *l.*		
stellulata *Good.*		
teretiuscula *Good.*		
vesicaria *L.*		
vulgaris *Fries.*		

Of these 28 species of Europe, 12 are Alpine, or found in high northern latitudes.

C. Ehrhartiana is found in Germany, and is probably a form of C. teretiuscula *Good.*

C. fulva was originally established upon a Newfoundland specimen, and has only been found once near Boston, U. S. A.

The 72 found in the United States are—

C. alopecoidea *Tuckn.*	C. folliculata *L.*	C. polymorpha *Muhlg.*
æstivalis *Curtis.*	glaucescens *Eh.*	refracta *Schk.*
alveata *Boott.*	Grayii *Carey.*	retrocurva *Dewey.*
Boottiaua *Benth.*	gigantea *Radge.*	sterilis *Willd.*
Barrattii *Tor.*	hyalina *Boott.*	sparganioides *Muhl.*
Baltzellii *Chapman.*	Halseyana *Dewey.*	Sartwellii *Dewey.*
Buckleyi *Dewey.*	Hitchcockiana	setacea *Dewey.*

	Dew.	
crus-corvi *Shutt.*	imbricata *Boott.*	Shortii *Tor.*
Careyana *Dewey.*	juncea *Willd.*	Steudelii *Kunth.*
Cherokeensis *Schwz.*	Knieskernii *Dewey.*	styloflexa *Buckley.*
Crawei *Dewey.*	lucorum *Willd.*	stenolepis *Tor.*
Cooleyi *Dewey.*	lupuliformis *Sartw.*	Sullivantii *Boott.*
Caroliniana *Buchley.*	lævigata *Smith.*	sychnocephala *Car.*
comosa *Boott.*	mirabilis *Dewey.*	strictior *Dewey.*
decomposita *Dewey.*	Mitchelliana *Curtis.*	tenax *Chapman.*
Davisii *Shwz.*	microdonta *Tor.*	tetanica *Schk.*
dasycarpa *Muhlg.*	Meadii *Dewey.*	torta *Boott.*
exilis *Dewey.*	mirata *Dewey.*	turgescens *Tor.*
Elliottii *Tor.*	oligocarpa *Schk.*	Tuckermani *Boott.*
Floridana *Tor.*	oxylepis *Tor.*	vestita *Willd.*
Fraseri *Sims.*	præcox *Jacq.*	venusta *Dewey.*
fœnea *Willd.*	panicea *L.*	virescens *Muhl.*
formosa *Dewey.*	platyphylla *Carey.*	vulpina *L.*
flaccosperma *Dewey.*	planostachys *Kunz.*	Woodii *Dewey.*

Of these 72 species, 4 only are common to Europe (England).

C. præcox *Jacq.* (introduced), found only in Salem, Massachusetts.

lævigata *Smith* (introduced), found once near Boston, Massachusetts.

panicea *L.*

vulpina *L.* Doubtful, probably a form of C. stipata. (Ohio, Illinois.)

I can offer you little that is satisfactory to myself as to the geographical range of the 97 species that are common to Arctic America and the States, for want of precise data as to the Carices of the Southern and Western States.

A.—I find, from such data as I have, that from lat. 30° to 35°, that is, from N. Orleans through the Carolinas, there are 33 species

extending into Arctic America, one of which, C. Novæ Angliæ *Schwz.*, ranging from N. Orleans to the Arctic Sea, maintains an equally vigorous development through 40° of latitude.

B.—From lat. 37° to 41°, Kentucky to Rhode Island, there are 21 species extending northwards.

C.—From lat. 42° to 45°, Massachusetts to Wisconsin, there are 43 species extending northwards.

Of the 72 species found in the States, 27 are southern species, ranging from Florida to Kentucky.

Of the 81 in Arctic America, there is, in

Newfoundland,	1. C. remota, *L.*
Labrador,	3. C. recta *B.*, nigra *All.*, ustulata *Wg.*
Greenland,	9. C. duriuscula *Mr.*, hæmatolepis *Dr.*, reducta *Dr.*, rufina *Dr.*, holostoma *Dr.*, hyperborea *Dr.*, microglochin *Wg.*, pedata *Wg.*, microstachya *Ehrh.*
Canada,	1. C. miliaris *Mx.*
Rocky Mountains	8. C. petasata *Dy.*, petricosa *Dy.*, filifolia *Nutt.*, Geyeri *B.*, Lyoni *B.*, Jamesii *T.*, dioica *L.*, Pyrenaica *Wg.*
Rocky Mountains and Altai,	1. C. Franklinii *B.* (C. macrogyna *Turczou*).
	18. C. authoxantha *Pr.*, anthericoides *Pr.*, Hoodii *B.*, amplifolia *B.*, Gmelini *H.*,

North-West coast,	circinnata *Mr.*, leiocarpa *Mr.*, marcida *B.*, micropoda *Mr.*, macrocephala *W.*, Mertensii *Pres.*, nigella *B.*, Sitchensis *Pres.*, Tolmiei *B.*, elongata *L.*, leporina *L.*, strieta *G.*, physocarpa *Presl.*
Newfoundland to Rocky Mts.,	1. C. ovata *Rudge.*
Greenland to Lake Superior,	1. C. bicolor *All.*
„ and Newfoundland to Arctic Sea,	1. C. glareosa *Wg.*
„ to Cumberland House,	1. C. subspathacea *Worm.*
„ to Arctic Sea,	3. C. stans *Dr.*, vahlii *S.*, ursina *Dy.*
„ Slave Lake, and Ft. Enterprise,	1. C. rotundata *Wg.*
„ and Mackenzie River,	1. C. rariflora *Sm.*
„ Bear Lake, and Rocky Mts.,	2. C. supina *Wg.*, vaginata *Tausch.*
„ Bear Lake, Church R. and Sask.	1. C. ampullacea *G.*
„ and Repulse Bay,	1. C. fuliginosa *St. & Hop.*
Greenland, Arctic Sea, Rocky Mountains, and North-West coast,	1. C. compacta *Br.*

„ to Rocky Mountains,	7. C. festiva *Dy.*, incurva *Light.* lagopina *Wg.*, nardina *Fr.*, obtusata *Lil.*, rupestris *All.*, saxatilis *L.*
„ to North-West coast (not Rocky Mts.),	3. C. salina *Wg.*, cryptocarpa *Mr.*, stylosa *Mr.*
Arctic Sea,	1. C. marina *Dy.*
Hudson's Bay to Methy Portage,	1. C. Houghtonii *Tor.*
„ to Cumberland H.,	2. C. heleonastes *Eh.*, maritima *Mull.*
Cumberland House, Mackenzie River, and Rocky Mts.,	1. C. concinna *Br.*
Carlton House,	2. C. Torreyi *Tuck.*, Hookeriana *Dy.*
„ to North-West coast,	1. C. Parryana *Dy.*
Methy Portage,	1. C. Raeana *B.*
Wooded Country,	2. C. affinis *Br.*, podocarpa *Br.*
Rocky Mountains to North-West coast,	5. C. Douglassii *B.*, Rossii *B.*, nigricans *Mr.*, macrochœta *Mr.*, stenophylla *Wg.*

Of the above 81 species, 36 are European!

England!	Scotland!	North of Europe!
C. remota *L.*	C. ustulata *Wg.*	C. bicolor *All.*
dioica *L.*	vahlii *Schk.*	subspathacea *Worm.*
elongata *L.*	rariflora *Sm.*	fuliginosa *S. & Hop.*
leporina *L.*	vaginata *Tausch.*	nigra *All.*
stricta *G.*	incurva *Light.*	microglochin *Wg.*
ampullacea *G.*	lagopina *Wg.*	microstachya *Ehrh.*
	rupestris *All.*	rufina *Dr.*
	saxatilis *L.*	Pyrenaica *Wg.* (Pyrenees!)
		obtusata *Lil.*
		supina *Wahl.*
		salina *Wahl.*
		maritima *Muller.*
		stenophylla *Wahlg.*
		heleonastes *Ehrh.*
		glareosa *Wahl.*
		festiva *Dy.*
		nardina *Fries.*
		pedata *Wahlg.*
		rotundata *Wahlg.*
		hyperborea *Dr.* (Lapland).
		holostoma *Dr.* (Lapland).
		cryptocarpa *Mr.* (Iceland).

Of these 36 European species found in Arctic America, 30 are Alpine or belonging to high northern latitudes.

C. Pyrenaica *Wahlg.* is confined in Europe to the Pyrenees!

C. remota *L.*, common in England, has been found only in Newfoundland. Royle has found it also on the Himalayas and at Kunawur in the East Indies!

C. festiva *Dewey*, found in Norway, Finmark, and Lapland, extends in America from Greenland to Unalaschka, and along the Rocky Mountains to the Straits of Magellan!

The 45 American species in Arctic America are:—

C. duriuscula *Meyer.*	C. Houghtonii *Terrey.*	C. podocarpa *Brown.*
circinnata *Meyer.*	reducta *Drejer.*	compacta *Brown.*
leiocarpa *Meyer.*	hæmatolepis *Drejer.*	concinna *Brown.*
micropoda *Meyer.*	stans *Drejer.*	Geyeri *Boott.*
stylosa *Meyer.*	petasata *Dewey.*	Lyoni *Boott.*
nigricans *Meyer.*	petricosa *Dewey.*	Hoodii *Boott.*
macrochæta *Meyer.*	Hookeriana *Dewey.*	Rossii *Boott.*
anthoxantha *Presl.*	marina *Dewey.*	Tolmiei *Boott.*
anthericoides *Presl.*	ursina *Dewey.*	marcida *Boott.*
physocarpa *Presl.*	Parryana *Dewey.*	nigella *Boott.*
Mertensii *Prescott.*	Torreyi *Tuckerman.*	Douglassii *Boott.*
Sitchensis *Prescott.*	ovata *Rudge.*	Franklinii *Boott.*
miliaris *Michaux.*	Gmelini *Hooker.*	Raeana *Boott.*
filifolia *Nuttall.*	macrocephala *Willd.*	amplifolia *Boott.*
Jamesii *Terrey.*	affinis *Brown.*	recta *Boott.*

A.— New Orleans, Cumberland House, Rocky Mountains, *C. umbellata*, *debilis*.

„ Greenland, Rocky Mountains, Arctic Sea, *C. Novæ Angliæ*.

Texas to Canada, *C. retroflexa, grisea, blanda, triceps*.

„ Hudson's Bay, *C. Muhlenbergii*.

„ Carlton House, North-West coast, *C. anceps*.

Georgia to Canada, *C. lupulina, commutata, squarrosa, tentaculata, striata, hystericina, miliacea*.

South Carolina to Canada, *C. cephalophora, varia, granularis, vulpinoidea*.

„ „ „ and Rocky Mountains, *C. bromoides*.

„ „ Cumberland House, *C. crinita, intumescens*.

„ „ „ „ Rocky

Mountains, North-West coast, *C. stellulata*.

„ „ „ „ North-West coast, *C. stipata, scoparia, lagopodioides*.

„ „ Hudson's Bay, Norway House, *C. polytrichoides*.

South Carolina to Lake Winnipeg, *C. lacustris*.

„ „ North-West coast, *C. rosea*.

North Carolina Mountains of, Observatory Inlet, Cumberland House, North-West coast, *C. Buxbaumii*.

„ „ to Canada, *C. conoidea*.

„ „ Cumberland House, Rocky Mountains, *C. Pennsylvanica*.

B.— Kentucky to Canada, *C. pubescens*, *digitalis*.

„ Mackenzie River, Rocky Mountains, *C. eburnea*.

Illinois, Cumberland House, Rocky Mountains, North-West coast *C. Richardsoni*.

New Jersey to Canada, *C. Schweinitzii*.

„ North-West coast, *C. aperta*.

„ to Hudson's Bay, Arctic Sea, Rocky Mountains, North-West coast, *C. livida*.

Ohio to Cumberland House, *C. arida*.

„ Carlton House and Rocky Mountains, *C. Backii*.

Pennsylvania to Canada, *C. subulata*, *scabrata*, *bullata*.

„ Cumberland House, *C. gracillima*, *cristata*, *plantaginea*.

„ „ „ Rocky Mountains, *C. pedunculata*, *utriculata*.

„ Greenland, North-West coast, *C. vesicaria*.

„ North-West coast, *C. angustata*.

Rhode Island to Bear Lake, *C. mouile*.

„ Greenland, Cumberland House, Rocky Mountains, North-West coast, *C. adusta*.

C.— Massachusetts and Newfoundland, *C. fulva*.

„ North-West coast, *C. muricata*, *verticillata*.

Michigan to Canada, *C. festucacea*.

„ Cumberland House, *C. Ehrhartiana*.

„ Carlton House, Rocky Mountains, *C. teretiuscula*, *trisperma*.

„ Canada, North-West coast, *C. straminea*

„ and North-West coast, *C. Liddoni*.

New York to Canada, *C. arctata*.

„ „ Rocky Mountains, C. Willdenowii.

„ Cumberland House, *C. pallescens*, *pseudocyperus*, *temiflora*, *vitilis*, *flava*, *aristata*, *filiformis*, *irrigua*.

„ „ „ Rocky Mountains, *C. siccata*, *longirostris*.

New York to Cumberland House, North-West coast, *C. retrorsa*

„ „ „ Greenland, Hudson's Bay, *C. Œderi*.

„ Mackenzie River, Rocky Mountains, *C. aquatilis*.

„ „ North-West coast, *C. lanuginosa*.

„ Bear Lake, Rocky Mountains, North-West coast, *C. limosa*.

„ Hudson's Bay, Carlton House, Rocky Mountains, North-West coast, *C. aurea*.

„ Newfoundland, *C. flexilis*.

„ „ Greenland, Arctic Sea, Rocky Mountains, North-West coast, *C. vulgaris, canescens*.

„ „ Rocky Mountains, North-West coast, *C. pauciflora*.

„ Greenland, *C. gynocrates*.

New York Mountains of, to Mackenzie River, *C. lenticularis*.

„ „ Greenland, Arctic Sea, Rocky Mountains, *C. scirpoidea*.

„ „ „ Labrador, Arctic Sea, *C. rigida*.

„ White Mts. of New Hampshire, Bear Lake, *C. oligosperma*.

„ „ „ „ North West coast, *C. rostrata*.

New Hampshire, White Mts. of, Canada, Greenland, Rocky Mountains, *C. atrata*.

„ „ „ Greenland, Hudson's Bay, Rocky Mountains, *C. capitata*.

„ „ „ „ Bear Lake, Rocky Mountains, *C. capillaris*.

Wisconsin to Canada, *C. tenella*.

„ Cumberland House, Hudson's Bay, *C. chordorrhiza*.

„ „ „ Rocky Mountains, *C. Deweyana*.

The geographical range, as far as I know it, of the 72 species found in the United States is as follows:—

Florida, *C. tenax, Baltzellii, oxylepis*.

„ to New Orleans, *C. gigantea, Floridana*.

„ Georgia, *C. dasycarpa, turgescens*.

„ Carolinas, *C. glaucescens, venusta, Elliottii*.

„ New England, *C. folliculata, polymorpha*.

Texas, *C. alveata, hyalina, imbricata, microdonta, planostachys*.

„ to Alabama, *C. Cherokeensis*.

„ Kentucky, *C. stenolepis*.

„ New Jersey, *C. flaccosperma*.

„ Rhode Island, *C. fœnea*.

New Orleans, *C. Boottiana*.

„ to Wisconsin, *C. Meadii*.

Carolina, South, *C. Buckleyi, Caroliniana, Mitchelliana, Fraseri, juncea, styloplexa, lucorum*.

„ to Virginia, *C. æstivalis*.

„ Massachusetts, *C. comosa*.

Carolina, North, to Ohio, *C. Sullivantii*.

Virginia to Kentucky, *C. Shortii*.

Kentucky to New York, *C. oligocarpa, Hitchcockiana*.

„ Connecticut, *C. Davisii, virescens*.

Ohio, *C. tetanica, crus-corvi*.

„ to Pennsylvania, *C. strictior*.

„ New Jersey, *C. Tuckermani*.

„ New York, *C. Careyana*.

„ Illinois, *C. vulpina*.

Pennsylvania, *C. refracta*.

„ to Cherokee, *C. sterilis*.

„ Connecticut, *C. torta*.

New Jersey, *C. Barrattii, Kneiskernii*.

„ to Rhode Island, *C. Halseyana, platyphylla*.

„ Connecticut, *C. vestita*.

New York, *C. alopecoidea, formosa, lupuliformis, mirata, sychnocephala, Woodii*.

„ Michigan, *C. crawei, Sartwellii, decomposita, Steudelii*.

„ Rhode Island, *C. retrocurva*.

„ Massachusetts, *C. exilis*.

„ Connecticut, *C. Grayii*.

Massachusetts, *C. setacea, præcox, panicea, lævigata*.

„ to Michigan, *C. mirabilis*.

Michigan, *C. Cooleyi*.

Wisconsin to New England, *C. sparganioides*.

For the following notice and list of insects collected on the

Expedition, I am indebted to Adam White, Esq., F.L.S., &c., of the British Museum. With respect to the extent of the collection, it is to be observed that no time was devoted to the capture of insects. Such as presented themselves at convenient times were taken, but none were sought for; and the numbers of the list are not, therefore, to be considered as a criterion of the richness of the country in that division of the animal kingdom.

Note on Hymenoptera in Arctic North America.

"Otho Fabricius first, perhaps, recorded any of the *Hymenoptera* of Arctic North America. Doubtless Baffin, Frobisher, and other manly navigators recognised bumble bees and other bees during their summer voyages, and *may* have, in print or in manuscript, with sailor-like earnestness, made mention of every such occurrence in their journals. It is delightful to read the notices of flowers and verdure in their accounts of the hurried spring, summer, and autumn two months of a Greenland year, of five-sixths winter. *Where* flowers and verdure abound, even for six weeks or a shorter time, *there* insects must be found;—*there* insects of the order *Hymenoptera*, the order to which this notice is limited, *must* occur. Flowers and *Hymenoptera* must be together.

"O. Fabricius records two species of *Hymenoptera* as being brought by him from Greenland. His book, so admirable a model of a local fauna as to be even now one of the standards of excellence, was published in 1780. The next considerable accession to our acquaintance with the *Hymenoptera* of British America was made by Redman, who collected in Nova Scotia many fine species now in the British Museum. Some of these, such as *Pelecinus*, *Sirices*, *Ichneumonidæ*, &c., were very prominent species, and are now being worked out in the vast collections of the National Museum.

"Sir John Richardson and his brave comrades collected many species, which were lost during their disastrous journey. They still, however, brought many insects to England, and in the '*Fauna Boreali-Americana*' these insects are described by the venerable Kirby. The species of *Hymenoptera* are very few; there are only *thirty-two altogether*; the circumstances attending the journey not admitting of their

collection and preservation.

"An eminent man, reasoning on such data as he had, has recorded his belief that it will be found that *Hymenoptera* do not abound in British North America; now it may be remarked in making generalisations on the distribution of animals, especially those of the lower orders, 'that, before generalising on a collection from any place not often visited or not often explored, attention be paid to the taste or tastes, or, in other words, to the bias or direction of the eye, hand, and mind of the person or persons who collect, supposing such reasoning is recorded as on authentic data.'

"Mr. George Barnston, to whose researches Sir John Richardson directed public attention in the 'Edinburgh New Philosophical Journal' for April, 1841, has published a very admirable summary of the Progress of the Seasons as affecting Animals and Vegetables at Martin's Falls, Albany River, James's Bay, about lat. 51° 30′ N., and in long. 86° 20′ W. In this fresh and refreshing journal, there are *more than indications* that *Hymenoptera*, *Diptera*, and *Neuroptera* abound. In a year or two afterwards Mr. Barnston came to London and presented his collection to the British Museum.

"As one instance of his excellence as a collector, I may mention that Mr. Walker, who named and described the species of *Diptera* in the Cabinet of the British Museum, has alluded to or has described nearly 250 species of his dipterous insects from the single station mentioned above; there being only 14 species of these insects recorded in the '*Fauna Boreali-Americana*' of the Rev. Wm. Kirby. Mr. Barnston's researches among the *Neuroptera* also were considerable and very valuable. One insect brought by him, the *Pteronarcys regalis* (although previously found in Canada), afforded Mr. Newport a fit subject for his genius as an accurate anatomist and recorder of facts and reasonings on the insect economy. This gentleman discovered persistent *branchiæ* in the *imago* or perfect state of the *Pteronarcys*, and has recorded his discovery and quoted some observations of Mr. Barnston's in a paper read at the Linnæan Society. As Mr. Gray's Catalogues of the collections in the British Museum, (mines of information to the reasoner and writer on geographical distribution,) are published, it will be seen how valuable are Mr. Barnston's and Sir John Richardson's collections to our acquaintance with the articulated animals of British North America, especially in its more northerly parts.

"I have mentioned that Kirby *describes* or alludes to only thirty-two species of *Hymenoptera* in his 'Insects of North America;' while Mr. Barnston *in one spot* found 192 distinct species, exclusive of *Chalcididæ*. "I subjoin a comparative list of the families of *Hymenoptera*, the comparison being made with the British species existing in the Museum collection at the time of this record. Mr. B. and myself worked out the *Tenthredinidæ*; my friend and coadjutor Mr. Frederick Smith, an able hymenopterist, determined the other species; so the list may be deemed as correct as the circumstances will admit.

"It must be borne in mind that our British collection of *Hymenoptera* has been accumulating for at least thirty years, was a favourite part of Dr. Leach's collection, and has been made over a wide and variegated country; while Mr. Barnston's was formed in three months, on one spot and under almost unheard-of disadvantages, counterbalanced, however, by an enthusiasm not easily deterred by difficulties.

	British Collection in British Museum.	Collected at Martin's Falls.
Cimbicidæ	10	4
Tenthredinidæ	157	76
Siricidæ, &c.	7	2
Ichneumonidæ	200	47
Chalcididæ	?	?
Chrysididæ	22	1
Formicidæ	11	7
Mutillidæ	5	0
Sapygidæ	2	0
Pompilidæ, &c.	38	2
Crabronidæ	57	16
Vespidæ	17	4
Apidæ	170	33

"A striking proof that the time has not yet come to reason correctly on the distribution of Hymenopterous insects,—at least in British North

America.”

No. IV.
LIST OF INSECTS

Taken by Sir John Richardson and John Rae, Esq., in Arctic North America, drawn up by Adam White, Esq., F.L.S., etc.

Coleoptera.

Cicindela longilabris, *Say*. (C. albilabris, *Kirby*). Shores of Arctic Sea, lat. 70° N.; and at Fort Simpson, lat. 62° N.

Cicindela hirticollis, *Say*. Borders of Mackenzie and Slave Rivers, lat. 59°-62° N.

Dromius nigrinus, *Eschsch*. Great Bear Lake, lat. 66°-67° N.

Carabus ——? n. s. (C. gladiator, *Barnston MS.*). Borders of Mackenzie and Slave Rivers, lat. 50°-65° N.

Carabus Chamissonis, *Eschsch*. Borders of Mackenzie and Slave Rivers; and Cape Krusentern, lat. 58°-68° N.

Carabus ——? n. s. (C. Hudsonicus?) Borders of Mackenzie and Slave Rivers, lat. 58°-65° N.

Calosoma calidum, *Auct*. Borders of Mackenzie and Slave Rivers, lat. 58°-65° N.

Loricera pilicornis, *Auct*. Great Bear Lake, lat. 66°-67° N.

Elaphrus intermedius, *Kirby*. Great Bear Lake, lat. 66°-67° N.

Notiophilus sibiricus, *Motchoulsky*. Great Bear Lake, lat. 66°-67° N.

Dicælus ——? n. s. (D. sculptilis?) Borders of the Mackenzie and Slave Rivers, lat. 58°-65° N.

Agonum melanarium, *Dej*. Great Bear Lake, and district to the south of Lake Winipeg, lat. 49°-68° N.

Argutor brevicornis, *Kirby*. Borders of Mackenzie and Slave Rivers.

Omaseus orinomum, *Leach*. District south of Lake Winipeg, lat. 50°-54° N.

Platysma vitrea, *Eschsch*. Borders of Mackenzie and Slave Rivers.

Pæcilus lucublandus, *Say*. Borders of Mackenzie and Slave Rivers.

Harpalus ——? n. s. (near H. obtusus). Borders of Mackenzie and Slave Rivers.

Stenolophus ——? n. s. Great Bear Lake, lat. 66°-67° N.

Amara ——? sp. (near A. trivialis). South of Lake Winipeg, lat. 49° N.
Amara ——? sp. Great Bear Lake.
Bembidium conicolle, *Motchoulsky* (B. impressum, *Kirby*). Great Bear Lake, and north of Lake Winipeg, lat. 49°-67° N.
Acupalpus ——? n. s. Great Bear Lake, lat. 66°-67° N.
Peryphus ——? sp. Great Bear Lake.
Platytrachelus ——? n. s. Great Bear Lake.
Notaphus nigripes, *Kirby*. Great Bear Lake.
Notaphus variegatus, *Kirby*. South of Lake Winipeg, lat. 49° N.
Dytiscus Harrisii, *Kirby*. South of Lake Winipeg.
Agabus ——? n. s. (near A. arcticus). Cape Krusenstern, lat. 68° N.
Colymbetes ——? sp. Borders of Mackenzie and Slave Rivers.
Hydrophilus picipes, *Auct*. South of Lake Winipeg, lat. 49° N.
Heterocerus ——? n. s. (near H. fossor). Great Bear Lake.
Staphylinus villosus, *Grav*. South of Lake Winipeg, lat. 49° N.
Quedius, n. s. (near Q. molochinus). Great Bear Lake, lat. 66°-67° N.
Omalium, n. s. (near O. rivulare). Shore of Arctic Sea, near mouth of Mackenzie River, lat. 70° N.
Anthophagus, sp. Borders of Mackenzie and Slave Rivers.
Silpha Lapponica, *Auct*. Fort Simpson; Borders of Mackenzie and Slave Rivers.
Silpha opaca, *Auct*. Borders of Mackenzie and Slave Rivers.
Silpha, n. s. (near S. Baikalica), *Motchoulsky*. Borders of Mackenzie and Slave Rivers.
Ptinus fur, *Auct*. South of Lake Winipeg. Throughout Rupert's Land.
Byrrhus ——? n. s. Borders of Mackenzie and Slave Rivers, lat. 58°-65° N.
Byrrhus ——? n. s. South of Lake Winipeg.
Rhisotrogus fervens, *Gyll.* South of Lake Winipeg, lat. 49° N.
Platycerns piccus, *Web*. Fort Simpson, on the Mackenzie River, lat. 62° N.
Cyphon fuscipes, *Kirby*. Great Bear Lake.
Elater æripennis, *Kirby*. Shore of Arctic Sea, near Mackenzie River, lat. 70° N.
Elater æneus? Borders of Mackenzie and Slave Rivers.
Elater, n. s. (near E. melancholicus). Borders of Mackenzie and Slave Rivers.

Elater, n. s. (near E. sanguineus). Borders of Mackenzie and Slave Rivers.

Ludius, n. s. (near L. sibiricus). Great Bear Lake, lat. 65°-67° N.

Ampedus, n. s. Great Bear Lake.

Buprestis tenebrica, *Kirby*. Borders of Mackenzie and Slave Rivers.

Chrysobothris, n. s. Fort Simpson, on the Mackenzie River, lat. 62° N.

Trachypteris Drummondi, *Kirby*, var. Fort Simpson, on Mackenzie River, lat. 62° N.

Trachypteris decolorata (Bupr. appendiculata, *Kirby*). Fort Simpson, on Mackenzie River, lat. 62° N.

Ellychnia corrusca, *Auct.* South of Lake Winipeg.

Ragonycha cembricola, *Eschsch.* Great Bear Lake, lat. 65°-67° N.

Thanasimus abdominalis, *Kirby*. Great Bear Lake.

Hydnocera, n. s. Great Bear Lake.

Blapstinus æneus, *Deg.* South of Lake Winipeg.

Upis ceramboides, *Auct.* Fort Simpson, and Borders of Mackenzie and Slave Rivers.

Anthicus ——? n. s. Great Bear Lake.

Formicoma ——? n. s. Great Bear Lake.

Stenotrachelus Roulieri, *Motch.* var. Shores of Arctic Sea, near Mackenzie River, lat. 70° N.

Serropalpus ——? sp. Fort Simpson, on Mackenzie River.

Hylobius ——? sp. Borders of Mackenzie and Slave Rivers.

Alophus ——? sp. South of Lake Winipeg.

Alophus ——? sp. Cape Krusenstern, lat. 68° N.

Erirhinus, sp. (near E. tremulæ). South of Lake Winipeg.

Tomicus ——? sp. South of Lake Winipeg.

Asemum striatum, *Auct.* Fort Simpson on the Mackenzie River.

Callidium bifoveolatum. Cape Krusenstern and Arctic Coast, between 67½° and 68°.

Callidium Proteus, *Kirby*; and C. simile, *Kirby*, var. Arctic Coast, between 67½° and 68°; Fort Simpson on the Mackenzie River, lat. 62° N.

Clytus undulatus, *Say.* Shore of Arctic Sea; Mouth of Mackenzie River.

Clytus ——? sp. Shore of Arctic Sea; Mouth of Mackenzie River, lat. 70° N.

Acanthocinus pusillus, *Kirby*. Great Bear Lake, lat. 66°-67° N.

Monochamus resutor, *Kirby*. Fort Simpson, on the Mackenzie River.
Monochamus confusor, *Kirby*. Borders of Mackenzie and Slave Rivers.
Acmæops Proteus (*Kirby*), *Leconte*; Leptura strigilata, var.? Fort Simpson, on the Mackenzie River.
Acmæops strigilata (*Fabr.*), *Lec.* Shore of Arctic Sea (Mouth of Mackenzie).
Pachyta liturata, *Kirby*. Fort Simpson, on the Mackenzie.
Pachyta, n. s. Fort Simpson, on the Mackenzie.
Rhagium lineatum, *Auct*. Fort Simpson, on the Mackenzie.
Syneta carinata, *Eschsch.* About Great Bear Lake.
Galleruca marginella, *Kirby*. Borders of Mackenzie and Slave Rivers; and about Great Bear Lake.
Chrysomela multipunctata, *Say.* Borders of Mackenzie and Slave Rivers.
Phædon Adonidis, *Pall.* Shore of Arctic Sea (Mouth of Mackenzie); Fort Simpson.
Adoxus vitis, *Fabr.* District about Great Bear Lake, and Borders of Mackenzie and Slave Rivers.
Coccinella 13-punctata, *Auct*. Great Bear Lake, lat. 65°-67° N.
Coccinella 5-notata, *Kirby*. Shore of the Arctic Sea; Mouth of Mackenzie, lat. 70° N.
Coccinella ocellata, *Auct*. Borders of Mackenzie and Slave Rivers.

Orthoptera.

Locusta tuberculata, *Pal de Beaux*.? Borders of Mackenzie and Slave Rivers; Fort Simpson.
Locusta, four species. Borders of Mackenzie and Slave Rivers.
Acrydium granulatum, *Kirby*. Borders of Mackenzie and Slave Rivers; Fort Simpson.

Neuroptera.

Æschna borealis, *Zetterst.*? Borders of Mackenzie and Slave Rivers.
Libellula ——? sp. Fort Simpson on Mackenzie.
Libellula scotica, *Donox*.? Between Lake Winipeg and Lake Superior.
Agrion cyathigerum, *Charp.* var. Borders of Mackenzie and Slave

Rivers.

Ephemera viridescens ——? n. s., *Barnston*. Between Lake Winipeg and Lake Superior, lat. 47°-52°.

Ephemera ——? n. s. South of Lake Winipeg, lat. 49° N.

Pteronarcys regalis, *Newman*. Borders of Mackenzie and Slave Rivers.

Pteronarcys Proteus, *Newman*? Shores of Arctic Sea (Mouth of Mackenzie River), lat. 70°.

Perla ——? (sp. near P. abnormalis, *Newman*). Borders of Mackenzie and Slave Rivers.

Perla ——? (sp. near P. sonans, *Barnston*). Borders of Mackenzie and Slave Rivers.

Semblis ——? n. s. Borders of Mackenzie and Slave Rivers.

Phryganea striata, n. s., *Barnston*. Borders of Mackenzie and Slave Rivers.

Phryganea variegata, n. s., *Barnston*, and two or three other species. Borders of Mackenzie and Slave Rivers.

Hymenoptera.

Trichiosoma lucorum, *Auct*. Fort Simpson, on Mackenzie River.

Tenthredo (Nematus). Great Bear Lake.

Tenthredo (Nematus) ——? n. s. South of Lake Winipeg.

Tenthredo integra? About Great Bear Lake.

Tenthredo (Dolerus). South of Lake Winipeg.

Sirex flavicornis, *Fabr.* Cape Krusenstern; Fort Simpson on Mackenzie, and country south of Lake Winipeg.

Ephialtes ——? sp. Fort Simpson, on Mackenzie River.

Aspizonus ——? sp. Arctic Sea (Mouth of Mackenzie River).

Ichneumon ——? sp. Fort Simpson, on the Mackenzie River.

Ichneumon ——? sp. Cape Krusenstern, and Fort Simpson on the Mackenzie River.

Cryptus ——? sp. South of Lake Winipeg.

Chrysis ——? sp. Cape Krusenstern.

Mutilla ——? sp. About Great Bear Lake.

Formica herculeana. About Great Bear Lake; Borders of Mackenzie and Slave Rivers; Fort Simpson.

Formica sanguinea. South of Lake Winipeg, and Fort Simpson.
Pompilus ——? n. s. Borders of Mackenzie and Slave Rivers.
Odynerus ——? n. s. Shore of Arctic Sea (Mouth of Mackenzie River).
Vespa maculata, var. Borders of Mackenzie.
Vespa vulgaris, *Auct*. Borders of Mackenzie and Slave Rivers and Fort Simpson.
Vespa marginata, *Kirby*. Cape Krusenstern.
Halictus ——? (n. s. near H. quadricinctus). South of Lake Winipeg.
Halictus, three black species. South of Lake Winipeg.
Megachile Willughbiella? Fort Simpson, on the Mackenzie River.
Bombus arcticus? Arctic Coast between 67½° and 68°; Borders of the Mackenzie and Slave Rivers.
Bombus (sp. near B. lapponicus). Arctic Coast between 67½° and 68°.
Bombus ——? sp. Shore of Arctic Sea (Mouth of Mackenzie River).
Bombus pratorum. Borders of Mackenzie and Slave Rivers.
Bombus, n. s. (near B. Incorum). Arctic Coast between 67½° and 68°.
Bombus, n. s. Arctic Coast.

Hemiptera.

Acanthosoma boreale, *Hope*. Great Bear Lake.
Acanthosoma nebulosum, *Kirby*. South of Lake Winipeg.
Miris ——? sp. Great Bear Lake.
Rhyparochromus, two species. South of Lake Winipeg.
Salda ——? sp. (near S. riparia). Cape Krusenstern, lat. 68° N.

Homoptera.

Aphrophora, sp. Great Bear Lake, and to the south of Lake Winipeg.

Lepidoptera.

Papilio Turnus, *L*. Fort Simpson, on Mackenzie River.
Pontia casta, *Kirby*. Arctic Coast between 67½° and 68°.
Pontia, sp. Fort Simpson, on the Mackenzie.

Anthocharis ——? n. s. (near A. Simplonia). Arctic Coast between 67½ ° and 68°.
Colias Palæno, *L.* Fort Simpson, on the Mackenzie River.
Colias Boothii, *Curtis*. Arctic Coast between 67½° and 68°.
Colias Chione, var.? *C.* Arctic Coast; Cape Krusenstern.
Argynnis Freija (*Thunb.*), var. Melitæa Tarquinius, *Curtis*. Arctic Coast between 67½° and 68°.
Argynnis ——? n. s. Arctic Coast.
Vanessa Milberti, *Godart*. (V. furcillata, *Say*). Fort Simpson, on the Mackenzie River.
Vanessa Progne, *Godart*. (V. C. argenteum, *Kirby*). Fort Simpson, on the Mackenzie River; Arctic Coast between 67½° and 68°.
Nymphalis Artemis, *Auct*. Fort Simpson on Mackenzie River, and Borders of Mackenzie and Slave Rivers.
Chionobas Bore, *Boisd.*? Arctic Coast between 67½° and 68°.
Hipparchia, n. s.? (near H. discoidalis), *Kirby*. Arctic Coast between 67½° and 68°.
Hipparchia Rossii, *Curtis*. Arctic Coast between 67½° and 68°.
Polyommatus Franklinii, *Curtis*. Arctic Coast.
Arctia Americana, *Harris*, var. Borders of Mackenzie and Slave Rivers.
Hadena Richardsonii, *Curtis*. Arctic Coast between 67½° and 68°.
Anarta ——? sp. Arctic Coast between 67½° and 68°.
Geometridæ, two species. Arctic Coast between 67½° and 68°.
Tineidæ, three species. Arctic Coast between 67½° and 68°.

Diptera.

Culex ——? sp. Borders of Mackenzie and Slave Rivers.
Chironomus, sp. Borders of Mackenzie and Slave Rivers.
Tipula, sp. Arctic Coast between 67½° and 68°.
Tabanus, three species. Borders of Mackenzie and Slave Rivers.
Tabanus, two species. Arctic Sea, Mouth of Mackenzie River.
Eristalis flavipes, *Walker*. Borders of Mackenzie and Slave River, and district to the South of Lake Winipeg, lat. 49°-65° N.
Syrphus, sp. Borders of Mackenzie and Slave Rivers.
Musca, five species. Borders of Mackenzie and Slave Rivers.

Musca ——? sp. South of Lake Winipeg.
Œstrus Tarandi? Arctic Coast between 67½° and 68°.

No. V.
VOCABULARIES.

A. *Eskimo Vocabulary.*

The Kuskuchewak column of the following vocabulary is extracted from Bäer's work.[92] To draw up an effective comparative table would require a thorough acquaintance with both dialects, since the names of articles of dress, and implements of art, change with the materials of which they are formed; natural objects are differently designated, according to the circumstances under which they are viewed; and the terms for actions are altered, as the agents, time, place, and other circumstances, vary. Unless, therefore, these facts be known and attended to by one who forms a vocabulary, there may appear to be no resemblance between the dialects of two tribes who mutually understand each other, and converse together with ease. The introduction of the syllabic characters used by the late Rev. Mr. Evans in teaching the Cree Indians would, I believe, remove the difficulties which orthography throws in the way of a European, who endeavours to reduce the native languages of North America to writing.

The column containing Eskimo spoken on the Labrador coast, is extracted from a pretty large vocabulary and grammar, which the Rev. Peter Latrobe had the kindness to procure for my use on the expedition. I have reason to believe that some errors may have crept into this vocabulary, from the similarity of the German written *h* to *s* not being always adverted to by the transcriber, and also from the uncertainty of the proper English equivalent of the German *v*. These are not, however, I trust numerous among the examples I have used. Where the Labrador dictionary was defective, the excellent English and Eskimo vocabulary, drawn up by Captain Washington, and published by the Admiralty for the use of the Searching Expeditions, has been referred to. The dialects spoken by the intermediate Eskimo tribes inhabiting the north shores of the continent are seldom quoted, my object having been to identify the language spoken by members of the nation occupying geographical positions the most remote from each other.

In writing out the table it was obvious to me that the Labrador dialect is in general the softer of the two. Instead of the hard *tch* so frequent in

the Kuskuchewak tongue, the east coast tribes generally use s, and in Coronation Gulf *h* is substituted. The strongly aspirated sound which is heard in the Scottish word "loch" is of frequent occurrence in the Kuskuchewak column of the vocabulary, where it is denoted by *kh*. An Englishman in attempting this sound lets the *k* be heard, which he ought not to do. The difficulty of constructing a correct Eskimo vocabulary is increased by the necessity of previously mastering the exceedingly numerous inflections of the nouns, adjectives, pronouns, and verbs, which supply the place occupied by auxiliary verbs, possessive pronouns, prepositions, and adverbs in the European languages. These inflections are briefly noticed in the introduction to Capt. Washington's vocabulary, and I shall merely add here, that in the Labrador grammar, obtained for us by Mr. Latrobe, there are examples of thirty different terminations of the dual and plural numbers of nouns, which have evidently had their origin in euphuism.

Each noun has six cases in each number, distinguished by their terminations, the vocative being, however, absent in some. The cases are formed by affixes having the power of prepositions, as *mut*, *mik*, *mit*, *me*, and *kut* in the singular, and *nut*, *nik*, *nit*, *ne*, and *gut* in the plural. The nominative is also varied by affixes which perform the functions of possessive pronouns, as *ga*, *go*, *ne*, *ait*, *anga*, *ara*, &c.; as *kivgah*, a servant, *kivganga*, my servant, *kivgane*, his servant; *nuna*, land, *nunaga*, my land; *nelegah*, a master, *nelegara*, my master; *tunnusuga*, my nation, &c. *Pagit*, *panga*, or *parma* are affixes employed when the noun is connected with a verb signifying action or suffering. The noun, when changed by a qualifying affix, is declined in its new form, in the usual way. Besides the ordinary active nominative, each noun has also an intransitive one, which ends in *b*, and is differently declined. Examples are subjoined. The power of the affixes varies according as the noun is used with a transitive or intransitive verb. Nouns may also be varied by affixes expressive of augmentation, diminution, affection, ridicule, humility, or multitude. Some of these terminations are *arsuk*, *arsuit*, diminutives; and *soak*, *sudset*, *sudsek*, augmentatives; *vak* placed before any of them increases their power; and the adverbial *aluk* denoting "very" may be put after them, and is applicable to either good or bad. *Vavak*, signifying an extraordinary number, is placed before *söareluit*.[93]

Adjectives have also their declensions; and likewise comparisons

made by the addition of the syllable *nek*, or by verbs. The adjective generally follows the noun, and must agree with it in case and number. If the substantive have an affix, so must the adjective. Nouns may be changed into verbs by the affix *evok* or *ovok*, and the adjective then must take the same termination.

Pronouns are declined like the nouns by affixes, which require much nicety in their due employment. Affixes supply the place of possessive pronouns.

The third person singular of the indicative is considered to be the root of the verb, and may be used as a noun with a change in the termination, "a hunter" being equivalent to "he hunts." The inflections of the verb are extremely numerous, and are expressive of affirmation, negation, interrogation, and of the various circumstances in which the agent or object can be placed with respect to time, place, mood, or possession. The infinitive, formed by the termination nek, is used when things are spoken of indefinitely, or when two verbs come together, and is conjugated in the same way as the other moods and tenses, there being a past and future infinitive. Generally the verb in the Labrador Eskimo agrees in its inflections with the Greenland dialect; but there are some special differences, and particularly with regard to the future, which has a threefold construction in the Greenland tongue, but is more simple in the Labrador speech. With the ample means which the regular verb possesses of expressing every mood and tense, the Eskimo has little occasion for auxiliaries, and in fact the structure of the language is very regular and exact.

There are, however, one or two auxiliaries which have an affinity to adverbs—such as *pi-wok*, which is used in a variety of ways, sometimes in immediate relation to a noun, sometimes only as an adjunct to a verb: it occasionally seems to be equivalent to the English "get" or "do." When placed after participles, which is its most common position, it signifies the action of a thing. *Ipsok*, another auxiliary, seems to be equivalent to the Latin *est*; it often increases the meaning of the verb with which it is connected. "To be," or "to have," is denoted by the syllables *gi* or *vi* in composition, as *nunagiva*, "it is his land."

The adverbs are numerous, and have relation to time, place, equality, size, number, order, union, separation, &c.; and also to questioning, denying, affirming, negativing, including, excluding, desiring, admonishing,

and distinguishing.

An example of the inflections of a single verb would occupy many pages, and cannot be given here; but the preceding short notices will suffice to show that vocabularies of the same language, formed by different people, may have little similarity, and that much care is requisite before we can venture to affirm the distinct origin of two tribes upon such evidence. In a language which is transmitted orally alone, and which is not preserved in its integrity by an appeal to the eye, alterations for the sake of euphony are frequent, and these, which are not uncommon with the Eskimo, vary with the delicacy of the ear of the speaker. Thus when the termination *wangha* does not blend pleasingly with the preceding syllable, *langha* is substituted, and the general pronunciation is more nasal with some small communities, more guttural with others.

EXAMPLES OF NOUNS DECLINED TRANSITIVELY AND INTRANSITIVELY.

TUPEK, *a tent*.

Sing.		*Dual.*	*Plural.*
Nom. tr.	Tupek }		
intr.	turkib}	tuppak	turket.
Gen.	turkib	tuppak	turket.
Dat.	tuppek	tuppak	turket.
	tuppermut	tuppangnut	tuppernut.
Acc.	tuppak	tuppak	turkinut.
	tuppernik	tuppangnit	turkit.
Voc.	caret.		
Abl.	tuppermit	tuppangnit	tuppermit.
	tuppermut	tuppangnut	turkinnut.

NELEGARA, *my master*.

Nom. tr.	Nelegara	nelegakka	nelekakka.
intr.	nelekama	nelekang-ma	nelekama.
Gen.	nelekama	nelekangma	nelekama.
Dat.	nelegara	nelegakka	nelekakka.
	nelekamnut	nelegamnut	nelekamnut.
Acc.	nelegara	nelegakka	nelekakka.
	nelekamnik	nelegamnik	nelekamnik.
Voc.	nelegara	nelegakka	nelekakka.
Abl.	nelekamnit	nelegamnit	nelekamnit.
	nelekamnut	nelegamnut	nelekamnut.

Nelegane, *his master*; neleganga, *another person's master*; and similar variations of the noun, have, in like manner, their various inflections.

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[92] BAER, *Statische und ethnographische Nachrichten über die Russischen Besitzungen an der Nordwestkuste von Amerika*. St. Petersburg, 1839, p. 259. The Kuskuchewak words being written in this work in Russian characters, with which I am unacquainted, J. F. von Bach, Esq., of the British Museum, had the kindness to furnish me with a translation. This gentleman drew up carefully columns representing the conventional English equivalents of the Russian characters for each word, and added also the French pronunciation, which want of space compels me reluctantly to omit. I have

made some small alterations in words written by him according to the English pronunciation, to suit the plan of orthography which I have followed in the other vocabularies.

[93] *Akkatu* is employed by the Eskimo of Churchill in the same way as *söareluit*.

Comparative Table of the Dialects spoken by the Beering's Sea and Labrador Eskimos.

Obs. S. denotes "singular;" D. "dual;" P. "plural." W. points out words taken from Captain Washington's vocabulary. *a* is sounded as in "father;" *ā* as in "law;" *e* as in "there;" *i* as *ee* in "see;" ī as in "ink," "pin;" *u* as *oo* in "good;" *kh* or *ch* in the Scottish word "loch," or Irish "lough;" *h* after *g* signifies that the latter has the soft pronunciation as in "give;" the hyphen following *g*, gives nearly the same sound.

English.	Kuskutchewak.	Labrador Eskimo.
The only Creator		Ping-ortitsi-o-wok.
God (the Creator)	nuna-lishta	Nuna, *country*.
Heaven; the firmament	ki-il-yak	killēk.
Earth, land, a country	nuni	nuna.
Air	u-i-uchu-yughi-ak	u-i-a-wak, *west wind*.
Air, wind, also the world and reason.		silla (sillata, *in the open air*).
Wind		anorre; sullu-ar-nèk, *also breath*.
The sun		sekkinek; (P. -erngit); nai-i-a.
Sun	akkta; pukli-anok	akki-suk-pok, *the sun breaks forth*.
Moon	tang-ek	takkek.
Month	tang-ak; igal-i-uk.	
Stars	mittit	ubluri-ak; ubloriak;

		(D. ubloritsek).
Comet	ag-i-akhn-akhtak.	
A star surrounded by a halo.		agsuk; (P. aguthet).
Water	mu-ek	immek, *fresh water*.
River	kvak	ku; kok; kogguk; koggut.
A large river		kokso-ak.
Sea	immakh-pik	immak.
The wide ocean		immarbikso-ak.
Lake	nanvik	akker-oktok, *a lake where deer are speared*.
A pond, fresh		tessek; (P. tessit).
Brook	kitchikli-ak	kōgak.
A tear		kogve; (P. kogvit).
Straits	u-ikakh	ikkarasak, W.
Cliff		ikkargok; (P. ikkarut).
Deeply cleft		korok; (P. kor-kut).
A long inlet		kang-erdluk.
Gulf or creek	nang-vagnak	(kang-ŭ-agnak? u-agnak *the west*).
Current	tchag-vak	sag-vak; sarvak.
Current in the sea		ingerarnek.
Current in fresh water		aksarnak.
Bottom of waters	notu-ik	tung-a-wik, W.
He treads his boot down at the heel.		tung-mark-pok.
Shore	chna; agavnu-ik	sĭg-sak.
Mouth or source of rivers, a well.	pa-i	(pè, *a court yard*; pa, *the round opening in a kai-yak*).
A bank in the sea, a		siorak-so-ak-nuk,

sunken rock	ithalh-nuk	*much sand*; ipek-so-ak-nuk, *much mud*.
Stone	tkalhk-uk	ka-ertok, *a rock*.
Deep	tuli.	
A sea bird		tullik.
It is deep (valley or river).		ittiwok.
Day	ignu-ik	uvlok, or úblok, *a day*.
In the morning		uvlakut; ublo-tillugo.
The day closes		uvlokliwok.
The morning, or the day.		kau; kauk; kaut.
The front or forehead		ke-uk; kauk; (P. karrut).
It is daylight		kau-ma-wok.
To-day		uvlut; ubluk; ovetsi-ak.
Night		u-nu-ak (P. unu-et),unuame.
Marsh	mag-ik	(mannèk, *moss*, W.).
Dry summer	ki-nu-ig-nu-ik.	
Summer		au-i-ak.
Mountain	ing-ik	kakkak; (P. kakket).
Lowland	tchu-iv-nu-ik	(su-yuk, *wet, dirty*).
Shell	ammokt	amomio-yok, *an oyster*; (P. amomio-yut).
White shell fish		ayöarnet.
Mussel		uvi-lok.
Snail shell		si-ut-terok, W.
The ear		si-ut.
A grain of sand		si-orak (D. -kek, P. -ket).
Sand	kag-u-i-ak.	

Clay (loam, chalk)	magai-ak	machak.
Fire	knu-ik	ikoma, *ignis*.
One who fires a gun		kukni-wok.
Wind	a-nuka	annore, W.; an-o-i, W.
Thunder	kalik.	
It thunders		kalukpok; kalludlarpok.
Lightning		kaumarlok (*vide* bright).
Rain	tchali-ali-ak; kitok	silla-luk; (silla, *air*).
Hailstone	kakhulat	(kakkulak, *it is round*, W.).
Anything sharp		kakilaut; P. lautit.
It is round		angma-la-rik-pok.
Snow	kanikh-chak	kannek, *falling snow*; (P. kang-it).
Ice	tchiko	siko.
Storm	anu-gavak	ani-gavak, *an extraordinary quantity of snow*; (anio, *a snow storm*).
Strong wind	(anug-wei, Kotz. S.W.).	akkunak; akkunak-so-ak.
Wind or air		annorre; annorer-ho-ak, *great wind*.
The wind is still		annorre-karung-napok.
Calm	ku-nu-ik	kunigok; (D. kunikuk).
Clear	tankikh-tchuk	alla-kak-pok.
A bright sky		alla-ki-wok.
Dark	telhk	tek, *darkness*.
Fog		tek-tuk; tartuk; (P. tar-tu-it).

It is foggy		niptai-pok, W.
The weather clears		nipter-pok.
Vapour or fog		iseriak, (isse, *severe cold*).
A cold		ikkĕ.
Clouded	tali-guk	tali-pok, *it is hidden*; (P. -pot).
A cloud		nu-vu-i-a.
Bright, or light	ugakhtok	kauma-wok, *it is bright*.
Coals	khumavit	P. aumakut; (S. aumako).
Ashes	agak	arsek, W.
Blue	vitok; minukh-kat	(minnu, *a sea-weed*, W.).
Bluish		tungo-i-uktak.
Berry juice		tungo.
Red	kivagok	aupa-luk-tok, *it is red*.
Blood		auk; aggut.
White	ugolh-kak	kaggark-pok, *it is white*.
Night	unuk	u-nu-ak; (D. u-nu-ek; P. unu-et).
Smoke	punk	pu-i-ok, *damp smoke, steam*.
It smokes		pu-i-ok-pok.
Smell	nagnak	naimawa, or nai-wok, *he smells something*.
Man (*homo*)	tatchu.	
A shadow		tatchak.
A looking-glass		tatchartut.
Man	nukalhni-ak	(nukak, *a brother*).
		ang-ut; (D. ang-u-tek;

Man (relation) stock		P. ang-ulit).
His father		ang-uta.
A helm		ang-ut.
An adult		ang-uti-marik.
People (Eskimos)	tagut; yugut	inu-it (S. i-nuk).
A name		taggisek.
My nation		tunnisuga.
Life		inusek.
A portrait of a man		inu-i-ak.
White man, European		kablunak: (P. kablunet).
Eyebrows		kablo; (D. kabluk; P. -t).
Inland Indian, stranger	alli-a-guk	allani-a-wok; (S. allak).
A man's foot mark		allok; (D. alluk).
Stranger Eskimos		si-ad-ler-mi-u; he-ad-ler-mi-u.
An unprotected man		sek-sariak.
Husband	vi-na	wi, *a married man*; (P. wi-nit).
One is with another		una.
She has a husband		wi-ghi-wok.
Wife	nuli-ga	nuli-a; (nuli-ang-a, *my wife*).
She or he has a brother's son or daughter.		nu-a-karpok.
A bachelor		nule-tok.
Widower		nuler-tok.
Old man	utchi-nuk; anuli-uvak.	
Male of man or beast		ussuk.

He is old		itta-wok; (itok, W.)
Hindmost		ittik.
Woman	aganak	ning-i yok; (aköa, D. akö-ak, *a mother*).
Old woman	aganukli-uvak	ning-i-vok.
The oldest of a family		ang-ai-i-uklek.
Brother's or son's wife		uk-ang-a.
Grandfather	apnugli-uk.	
Grandmother	annugli-u	anenak-si-ak.
They have a mother		mikli-ak-attig-ekput.
Mother	ani	anenak; akko-a.
Mother's milk		ammak.
She is beautiful		enanau-wok.
A relative	tunka.	
Father	atti	attatak; (P. attatet).
The father		attatu.
An adopted father		attatak-sak.
Son	igni-ak	ergnek; (P. ergnerit).
Daughter	panaga; panik	panik; (P. paniknit).
Brother	annak	(anènak, *mother*, *beauty*).
His elder brother		anningna.
Elder brother or sister		ango-i-uma.
Younger brother		nukak; nukka, *my brother*.
Sister	agna-vu-ik	neya; neyango, *his sister*; neyara, *my sister*.
Two uterine brothers		angu-tauk-attigekpuk.
A twin		ikking-ut; karrisarek, *twins*.
		nuka-pi-ak; (P. nuka-

A boy	tangoy-ali-uvak	pitset)
A young woman		ni-wi-ark-si-ak.
A girl	nozi-atchak	ni-wi-azi-ak.
Grandchild	tut-khih.	
A child belonging to the parents.		kittorng-ak.
A mother's only child		attung-ektak.
A woman's last child		mikki-erngo-a.
It is my child		kittom-yarivara.
An orphan		ananak-ang-ilak.
A fatherless child		atatai-tok.
An orphan deprived of both parents.		illi-arksuk; (P. illi-arksu-it).
His sister's child		u-i-orva.
A child		kittorng-ak; sorusek.
A little, or new born, child.		nutarak.
Uncle	anahkli-uvan.	
Aunt	annomak.	
His mother's sister	(*root?* aganak, *a woman*).	ai-ang-a.
His father's sister		at-sang-a.
Sister-in-law		sak-i-a, W.
A prudent woman		arnanda.
A robust man		atsu-ilik.
A countryman		nuna-kat; (P. nuna-kattiget)
A friend, one of two in company.		illek-sak.
A walking companion		tupperkat; (P. tupperka-tiget).
A travelling		ing-i-a-ket; (D. ingi-akattek; P. ingi-

companion.		akattiget).
A comrade (housemate).		iglo-mokat; (P. iglo-mokat-tiget).
I	khvana	u-wang-a.
Thou	lhpu-it	ig-vit.
Thee, *acc.*		illing-nik.
He	ikum	taim-na.
We		u-vag-ut P.; (u-va-guk, D.)
Ye, you	ilhli-te-pik	ilipsè, P.; (illiptik, D.; il-o-wit, *Church. Esk.*).
They		okkö-a.
He, *demonstr.*		taimna; taipsoma.
This		tamanno.
He, or she, *intransitive*	una	una; tamna.
He, or she, *transitive*		oma; tapsoma.
They	unut	okköa; tapköa.
Of mine		uvango; uwango.
To me	kvinum	uvamnut.
To thee	lhpinum	iling-nut.
To us		uvapting-nut.
To you		illipting-nut.
To him	umu-in; ikumin	omunga; tapsomunga.
To them		okkomunga; tapsomunga.
Of himself		ing-me.
To themselves		ingming-nut.
Whose? what? what kind? of whom?	kai-a; tchambi-a	kina? ki-a, *who?* (P. kikut).
Who? what thing?		suna? su-ub? (P. su-unt).
What do you say?		suva.

Of or by whom		ki-mit; kikkunit.
With what thing?		sumik?
What company?		kikkut?
Which	ke	kiput.
His	umnia	(*vide* of his).
Of his		oma; tapsoma.
Mine	kho-in-tchati-ka; khvona.	u-wanga.
Thine	ilh-pu-it; lhpu-it-ik	igvit, *of thine*.
This, *masc.*	unakh-wina	una; (inung-una, *this man*).
This thing		oma; (oma-pung-a, *his thing*).
That		imna.
Self		nang-ninek; (P. nang-merngit).
How? what?	tcha-itun	kannak.
The same		ingna.
Thus		tava.
Who are these people? who is the head of the family?		kik-ut?
Head	kamikuk; uksi-u; niba-gun.	ni-akko; (P. ni-akkut).
Crown of the head		kausek.
Forehead	tchughi-uk	ke-uk; ka-uk; (P. karrut).
Eyes	vi-tatu-ik	i-ye (ai-i-ga, W.); isse; (P. issit).
Eyebrow	ka-i-ag-mi-ut	kablo, S.; (P. kablut).
Eyelashes		kemerit-set.
Ears	na-i-utu-ik; tchu-u-tu-ik.	si-ut; (P. si-utik).
Mouth	kanik	kannerk; kaurngit.

Face		kènak.
Nose	nikh	king-ak; (P. king-et).
A horn		naksuk; (P. naksu-it).
Cheek		ulu-ak.
Muzzle		katang-ak.
Teeth	khu-u-tu-ik	ki-u-tit; (S. kig-ut).
Beard	unik	umik; (P. umgit), *also a curtain*.
Neck	u-i-anut	u-i-ak; (P. u-i-ait), *fore quarter of an animal*; konge-sek.
Hair (human) on the head.	nu-i-at	nu-i-ak; (P. nutset).
Hair, fur	mu-ilh-kut	merserpok, *also a feather*; (merkut, W.).
A needle		merkut.
A skin, general name		amek; (D. amok; P. armgit).
Hands	yagatchu-tu-ik	aggait, *hands and fingers*.
Two, numer.		aggait.
My hands		aggakka; aggaktit, *your hands*.
Foot	ig-uk	ittigak; (P. ittiket).
Finger	si-evogat.	
Thumb		kublo; (P. kublut).
Fore finger		tikkek; (P. tikkerit), *also a thimble*.
A sign to indicate anything (finger post).		tikkorut.
Middle finger		kettert-lek, W.
The middle		kerka.
He is in the middle		ketterpok.
Third finger		mikilirak, W.

Smallest		mikke; (mikkinek, *the least*).
It decreases		mikki-orpok.
The first		mikkledklek.
Little finger		erkekok, W.; mikkillerak; (P. mikkillaket).
Hands and feet together.		igluktuk.
Belly	aksi-ak	nek, *also the body*.
Tongue	ali-anuk	okak; (P. oket).
He licks with his tongue.		alluktorpok.
My tongue		okara.
A member of the body		nabgo-ak.
A leg		nabguk-pa; (ni-o, *leg or thigh*).
The trunk or body		mimmernet; time; (P. timet).
A headless body		kattik.
The back bone		ku-i-a-pigak.
The rump		nullok.
Blood	ka-i-unkak	auk; aggut.
To speak	kalkhtu-ik	o-karlune.
He is spoken of		kalle-mavok.
To cry	vikhpa-ga-ga.	
The waves roar		kadlarpok.
He weeps much		kai-u-mi-wok-nudlarpok.
He distorts his face in crying.		kakkerlu-arpok.
To laugh	nu-inhli-akhta.	
He laughs in mockery		i-yorkpork.
He is in a laughing or		illapsukpok.

weeping mood.		
To kill	tchikaliz-gi-u.	
Dead, (he is)	tukumak	tokkowok.
A corpse		time (*body*) -tokkung-a-yok.
Alive	u-nung-vak	innu-wok.
Life		innusek.
A living man		innuk.
Bad	tchakli-uk	(sèg-lu-wok, *he lies*).
He is very bad		a-yorpok; yudlarpok.
He becomes bad		assilè-wok.
Not good		nama-lung-ilak.
Good	knu-ignag-kuk	ai-ung-itok.
Very good, or great		ang-i-yok.
He is a good man		pillorik-pok; ridlarpok.
Brave	tuvgak	aksut, *also strong*.
Very brave or strong		aksorso-ak.
Coward	alantak	erksinadlarpok, *afraid*.
He is terror-struck		sakko-arpok.
He is timid		innimi-wok.
He loses courage		kotso-alavok.
Thick	ukughelghi-a.	
Lean, not stout	kui-migu-ilhnagak	
He is stout		kuini-wok.
Thin, or lean, (he is)		sallukpok; ludlarpok.
High	yukhtuli	portovok.
Low	yukh-kalhna-gak.	
Warm	kikh-tchatuk	ki-ek-pok; onatomik.
Heat	kalhtok	kivek; onarsivok.
It boils		kallapok.

To smell	nagne-chuk	nawok, *he smells*.
To spit	kchigu	(sigguk, *the beak*).
He spits out		oviakpok.
To cough	kuzgh-ga	ko-erlorpok, *he coughs*.
Pain	aknakhtu-a.	
Health	yuguntu-a.	
He is healthy		atsu-ili-wok, W.
Angry	wik-nu-i-chuk	ning-akpok; gadlarpok.
Quarrel	agu-i-a-uk	akgiwok, *he retaliates*.
Terrible	alu-innakh-kuk	adhei! (*interjection*).
Buy	kupuzg-u	akpang-erpok, *he buys*, W.; pussi-wok, *he buys it*.
Taken	tkhwaka.	
Take	tkhu	pi-uk, W.; pi-vok, or pi-wok, (*auxiliary*).
Give	ta-iz-ghu	ta-ug-si-lugo, *let us barter*, W.; pillata-wok, *he gives in reward*; pittipa, *he gives it to him to hold*.
Sell	kiputna-waka	ni-u-werpok, *he trades*.
Lively, joyous		pio-ri-wok; ku-wi-a-sik-pok, W.
Merry	nuna-nikh-kuk	nunan-ghi-a-suk-pok, *brisk*.
Tedious	nuna-ni-tu.	
He is weak		nuneněpok; sanghe-pok.
Song	i-vagun	iming-arkpok.

A song, hymn, or psalm		iming-erut-set.
Dance	kazi-i-achi-kut	okkigenek, W.
Truth	pachikh-pi-ak	(padsitik-sak, *an excuse*).
Lie	ikli-uk	seglu-wok, *he lies*.
Thief	tu-igli-nak	tiglik-pok, *he steals*.
Forest	nu-i-ku-ig-vakhtut	nappartok, *trees, something erect*.
Place having no trees		nappartu-itok.
Grass	tchaugu-it.	
Straw or grass on the sea shore.		i-wik; ibgit.
Berries	nangat	panug-at.
Moss	kumagu-i-tu-it	ting-ang-yak, *a bluish moss*; marnek, W.; neka-gasek, W.
Sphagnum palustre		orkso; (P. orksut).
Fir tree	nu-ikvag-vakh-tugvak.	
Firewood		ikko-maksak, W.; (ikkoma, *fire*).
Birch	ilhgnuk	okpit; kai-volik; (P. kai-vogit).
Alder	tchugvagvat.	
Poplar	avgnut.	
Willow	tchagatu-it	okau-jak.
Rock	u-ipnat	u-i-arak, *a stone*; kai-ertok, W.
Vessel, a bark	shunnak	umi-akso-ak.
A small boat of wood		umi-arak.
Baidare (skin boat)	anh-i-ak	umi-avik.
Baidarka	pukhtan; kai-ak	kai-ak, (*for one person*); (P. kai-net).

Flat-bottomed boat	anhi-akh-li-uk.	
Dog	anna-kukta	kemmek; king-mek; (P. king-mit).
Dog-sled	i-kam-chak	kam-utik, W.
Calls the dogs together.		kang-marpok.
Tanned sea-cow hide	amakh-kak.	
Arch	ugli-vu-ik	korok, W., *hollow*.
A valley		korkinek.
A bird arrow		nugit.
Arrow	ikkh-uk; pickh-tchagak.	karksok; (P. karksut).
Fish-hook		karsuk-sok.
Strap	nuk-tchaklik.	
Hand drum, tambourine.	tcha-ul.	
Shaman, sorcerer	tungalhkh; analhkh-tuk.	anghe-kok.
House		iglo; (P. iglut).
Hut, (abode of married people).	u-ina.	
Tent		tuppek; (P. turkit).
Snow house		iglorigak.
Indian tavern	akumgavak.	
To take a vapour bath	mu-ichtak.	
He bathes, he dips it		missukpok.
Armour	annu-i-akh-chutu-it.	
Guest	ali-anik	allak; allani-a-wok.
Give for a treat	tchaktchu.	
He gives a feast		nerri-marpok.
Eat	nuiga	nerri-wok, W., *he eats*.
Dining hall		nerriving-me.
	yaguzhgh-ghi;	

To make a present of	pikazhzgh-ghi.	pilli-ta-wok.
To sew	minka	mersorpok, *he sews*.
A needle		merkut; (P. merkutit).
To beat	pilli-akhku	anauwok, W.
He cuts it in pieces		pillakpok.
Red fish	nu-i-ku-it.	
Salmo orientalis	taghi-akvak.	
Salmo sanguineus	kak-ki-a.	
Salmo muksun	ka-ukh-tut	ekalluk, (P. ekalluktut), *salmon trout*.
Salmo alpinus	ankhli-u-gat	ekalli-et, *trout*.
Salmo proteus	atakak.	
Chaiko?	nu-ik-ni-at.	
Syrka	imakh-ping-at.	
Smelt	kpuka-chat.	
Eel pout	managnat.	
Pike	tchukvak.	
Fishing-net	kughya.	
A bag, a poke		pok.
Spawn	mass-i-uk.	
Cup	val-i-uk	korkok, *wide-mouthed-cup*; erngusok, *drinking-cup*.
Spoon		alu-pa-ut.
Pot	gant.	
Earthen pot, native		illuterkut, W.; (illuli-wok, *he hollows it out*).
Bladder	imangvik.	
Oar (boat's)	anvagun	(pa-ut; P. pa-utit); epat.

Entrails		erchavit P.; (S. erchavik).
Gut	iggzh-u-igli-uk	inelo; (P. inelu-it).
Kamlaika (cloth)	iggmagna-tu-ik.	
Woollen cloth		ateg-ek-sai-ah, W.
Parka	atkuk.	
Fur-boots	kamu-ik-si-ak	kamikso-ak.
Breeches	khulik	karlik; (P. karlit).
Cap	nachak	ketsivak, akkordlek, *also a jacket*.
Castor oil	alli-ukit-khak.	
Beaver	kini-i-uli	kig-i-ak; (P. kig-ilset).
Otter	chvignil´nuk.	
Sable	kakhchichvak	karvi-ait-si-ak.
Grey fox	u-ikh-pu-ikhtuk	arvngasek.
Red fox	kavhiatchak	ka-i-ok.
White fox	ulhi-gu-ik	teri-enniak; P. teriennit-sek.
Young fox	pi-i-a-gak	pei-a-raka, *a young quadruped or bird*.
Female bear		akbik.
Bear	unu-valh-iäkh	akhlak.
Polar bear		nennok; (P. nennut).
Wolf	ku-isli-unu-ik	amarrok; (P. amarkut); ammarwok.
Hare	ka-i-ukh-li	ukalek; (P. -lit); ikkingna.
Wolverene	kab-tchak	kablia-ri-u.
Marmot	kalh-ganakh-tuli	sik-sik; ullick.
Musk rat	sig-vak	kiv-galuk, W.
Casan marmot (*Citillus*).	kaninik	ik-ik; sik-sik.
Ermine	nagulhkk-ak	terri-i-a, W.
Lesser otter	amagmi-utak	pammi-oktok.

Tail of an animal		pammi-ok.
Mouse	avilh-nat	awing-ak, W.
Fly	chuvat	nivu-i-wok, *a large fly*.
A spider		assi-wak; (P. assi-vait).
Gnat, moschetoe	ig-tughi-ak; miku-ghi-ak.	kiktoriak; (P. kiktoritset).
Walrus tusk	tul-i-ak	tógak, W.; (tok, *a point*).
Walrus	azgh-vu-ik	ai-wek; (P. ai-werit).
Mammoth tooth	chagu-nu-ek.	
Back-fat of deer		tunnuk; (tunno, *the back*).
Tallow	anu-ignak	kui-ni-wok, *fat he is*.
Fat	u-ig-nu-ik.	
Rein-deer	tun-tu	tuktu; (P. tuktut.)
A large whale		korchak; (P. korchetset).
Delphinus leucas	chtvak	(sav-gak, *a water-serpent*).
A seal, general name		puese; (P. pue-sit).
Seal, largest kind	izli-ugvak	uksuk; oguk.
Small seal		netsi-arksuk; netsek.
Middle seal		kai-rolik.
Young ditto		pai-yarak.
Seal lying on ice		otok.
Spotted seal		kassigi-ak.
A seal with a pointed nose.		abba; (P. abbit).
Unborn seal		iblau.
The seal comes up to breathe.		pu-i-rook.
I will	piyukh-tu-a	pivok.

I will not	piyuk-nak-tu-a	piwak.
Go!	ai-i; ai-aghi	ailer-it, W.
Come!	ikh-tchika	kai-it!
He comes		kai-wok.
I come	ta-i-tchika.	
Bring	ta-iski-u	kaitsi-wok, *to bring*.
It is	pitankh-tok.	
Verily		ahammarik, (*emphatic affir.*)
Yes		katz; kassak; kaitsok; abeila; ang-erpok.
Certainly not!	tchata-i-tok	se-i-ovut, aukai-lo.
He says no		ang-ing-ilak.
Not		nankak, aukok.
Yet	tchali	sulle.
It is so (as you say)		abale.
Where?	na-ni?	nane?
Where is it?		nauk?
Whither?	nairt?	namut?
Which way? whereby?		naukut?
Here	khonikho	ovane mane; tamane.
Here about, around		ovona.
There	yani; ung-napi	mâne; tamâne.
Thither	yavu-it.	
Hither	akavu-it	ma-ungo; owunga.
There	khavana	ikkane.
Throw!	igazhgki-u	millorpok, *he throws*; egipok, *he throws away*.
So	khwatum	taimak; sorlo, *as*.
Now	khwatu-a	mâna.
In the present time		manakut.
Later, afterwards	atakh	king-urgane.
Aforetime		itsak.

Before	tehu-nu-imtpu	sivurnga-gat.
Straight before		miksane.
Before another		ane-taima, *also southward*.
Behind	kanulhklimtiv.	
Backwards		knig-o-mut.
Above, upwards	kulhma	kollanut; pa-ungo.
Below, beneath	ochi-mi	kanna; sammand.
Num. 1	atu-u-chik	atou-sek.
„ 2	a-i-nak; malbkhok	marruk; maggok, W.; (agga, *hands*).
„ 3	pa-i-na-i-vak	ping-a-sut; ping-ahuk, W.; ping-a-nuk, W.
„ 4	tchamik	sittamut.
„ 5	tali-mik	(tallek, *the hand*), tedlima; tellimet.
„ 6	akhvinok	arvanget; ping-a-su-yok-tut, *twice three*.
„ 7	a-i-na-akh-vanam	ping-a-sullo sitta-mello, W., *three and four*.
„ 8	pi-na-i-vi-akh-vanam	pina-i-u-ik, W.; ping-a-nuk, W.
„ 9	chtami-akh-vanam	tellimella sitta-mello, W., *five and four*.
„ 10	tamimi-akh-vanam	tellima-yoktut, W.
„ 11		arkang-et.
„ 16		arvertanget.
„ 20	tzvinnak	igluktut, *hands and feet together*.
„ 21		ungna.
Whale	akh-vu-ik	ar-wek.
Bird in general	tu-in-mi-ak	ting-mi-ak; (D. ting-mit-sek).

Eagle	nu-itu-i-gavi-ak	nektoralik.
Raven	kolh-ka-guk	kallu-gak.
Magpie	kalh-ka-gai-ak	
Hawk	naptak	kiga-wik, W.
Owl	iggi-akhtu-gali	upik, W.; upigu-ak, *great owl*, W.
Goose	nu-ikli-uk	nerlek, (P. nerlit).
Swan	kuglhi-uk	kog-uk, W.
Crane	ghi-na-tuli.	
Duck	tu-in-mu-ik	ting-mi-ak, (P. ting-mid-get), *a bird, in general*.
Sinew	ulhi-un; ivali-ut	uli-yut, W.
Glass bead	tu-ikh-lit	(tuè, *the shoulder*); sang-pang-ak, *beads*.
Blue	tchunaizi; tchu-a-gat	tung-a-yuktak; (tungo, *berry juice*).
White	katu-ighi-agvak	kaud-luk-pok, W.; (kau, *day*).
It is white		kaggarpok, W.
Red	kivikh-tchitkkhlat	auk-palliki-tak; (auk, aggut, *blood*).
Black	tunulhgat	kerngut; kernerpok; ker-nian-garvok.
Krelle	tchunaglat; anat	(sunak, W. *polar-bear*); (annak, *refuse of animals*).
Axe	kalhk-anak	tukkingai-ok; (P. -ut; kuksau-tok).
Adze		nella-yok.
Pickaxe		tik-lak.
Knife	ulhvak	ulima-ut, (P. ulima-utit, *a hatchet*).
Aleutian axe	knun.	

Scissors	ku-ipli-a-unu-ik	kipsaut, W.
He cuts something off		kippiwok.
Needle	minkuk; tchikuk	merkut; (sig-uk, *a beak*).
Button	nikht-ku-tu-it	sennero-ak; (P. sennerut-set).
Mirror	tangh-i-u-guk	takh-artut.
He sees him, or it		takko-wok.
Iron	nu-ilhkh-agak	kikki-ek, *general name*, *also a wooden or ivory pin*.
Copper	kanukh	kanu-yak, W.
Lead	khu-i-akak	aggiktok, W.
Shirt	tulhpakhak	uvinerok; (uvinite *the flesh*).
Linen waistcoat	alkuk	altighigha, *under jacket*, W.
Worsted ditto	tunulhkh-u-i-alkuk.	
Kettle	gantchavak	uk-ku-sik, *stone kettle*.
Dentalium shell	nuinhi-vaghi-ut.	
Ear-rings	aklatu-it	ukla.
Long	tatkhli.	
Short	nanilh-nuk	nai-pok.
Broad	yu-gu-tuli	silikpok, *it is broad and thin*.
Narrow	igu-kink-nuk	nerikipok, W.; amitok, W.
Fresh	milukapak.	
Sweet	mi-iknik-kuk	mamakpok, *it tastes nice*.
Sugar		mamamak-sauk.

VOCABULARY OF THE KUTCHIN OF THE YUKON OR KUTCHI-KUTCHI, DRAWN UP BY MR. M'MURRAY; TO WHICH THE CHEPEWYAN SYNONYMS WERE ADDED BY MR. M'PHERSON.

English.	Kutchin.	Chepewyan.
Animals.		
A bear	so	sasz.
grizzly bear	si-i	tlizè.
beaver	sè	tza; tsha.
red fox	na-kath	na-ghirhè-gossè.
black fox	nakath-barhata-nil-iz- zè.	na-ghirhè-sin.
cross fox	nakath-so	na-ghirhè-netlizzè.
white fox (arctic)	etchi-a-thwi	na-ghirhè-gai.
Canada lynx	ni-itchi	ghisè.
marten	tsu-ko	tha.
mink	tchith-ei	til-chusè; tekh-tusè.
otter	tsu-e	na-pi-ekh.
musquash	tzĕnn	tzĕn; tshĕn.
wolf	zo	yess; nuni-è.
hare (American)	kè	ka.
wolverene	lekh-ethu-e	nakh-ei.
seal	nät-tchuk	(nètsèk; netsi-arksuk, *Esk*).
moose-deer	tin-djukè	dnnikh.
rein-deer	bet-zey	bedzi.
goose	krè	tcha.
swan	ta-arr-zyne	kha-goss.
crane	che-a	dhell.
duck	tet-sun	yurrth-tcho.
grouse	akh-tail	dikh (*pintailed gr.*); kasbà, (*white gr*).
fish, a salmon	tlenkh-ko	tlu-e-tcho; tlu-e-zanè,

		trout.
white-fish (*Coregonus*).	tleukh-ko-tak-hei	tblu.
pike	alle-ti-in	uldai.
blue-fish (grayling)	rsi-tcha	thlu-è-detla.
methy (*Lota*)	che-tlukh	tin-tellei.
Trading Goods.		
An awl	tha	thuth, *a spear*.
An axe	ta-è	thell; thelth.
Beads	nak-kai-e.	
A belt	tho.	
A blanket	tselta	tsurai.
A tobacco-box	tseltrow-ti-ak.	
Buttons	yei-kai-thit-le	bun-eil-lay; pa-il-lay.
A cap	tsa-kol-u	tsa-kūlay.
A bonnet	tsa-til-ek-ha.	
A capot or coat	ik	ekh.
A duffle coat	chai-ik.	
A chisel	so-itt-se.	
A comb	tcheir-zug.	
A dagger	nil-ei-sho	la-thuth.
A file	kuk-i	hogulth; hok-kelth.
Tape gartering	lekath-at-hai-è.	
A looking-glass	mutchai-e-i-a.	
A gun	te-egga	tel-gŭrthè.
A gun-flint	bech-tsi	tlè-tell.
A gun-worm	koggo-te	ko-èdèh.
Gunpowder	tegga-kon	telgŭrre-koun-nè.
A powder-horn	a-ki-itchè.	
A kettle	thi-a.	tillè.
A knife	r’ si	bèss.
A ring	ilāt-thĕkk.	

A shirt	azu-e-i-ek	tse-tsi-eh; thisitei.
A small shot	tegga-ätsil	teli-thai-è.
A ball	tegga-atcho	tell-gith-tcho.
A fire-steel	il-i-a.	
Cloth	athit-li.	
Thread	athit-li-itchi.	
Tobacco	se' ei-i-ti-it	sel-tu-i.
Trowsers	illei-ik	(karlik, *Eskimo*).
Vermilion	tingi-ta-tseikh.	
Miscellaneous.		
A tree	tetch-hau	tsu.
A willow	kai-i	kai-thsinnè.
Grass	tlo	tlo.
The ground	nŭnn	nih.
Water	tchu	tu; to.
A river	han	dessh.
A lake	van	theu-tu-ĭ.
Rain	akh-tsin	dsha.
Warm	konni-etha	etu.
Cold	konni-eka	etdza.
Hungry	sei-ze-kwetsik	seth-ithu.
Fatigued	kei-a-sethelth-krei	ni-nitsau.
Sick	ĕth-ill-seyk	ai-a'.
A mountain	tha	sheth.
A valley	kra-tannè	shegussè.
The sun	r' sey-è	sakh.
The stars	thun	thun.
A rock	tchi	thi 'tsunnè-cho.
A house or fort	izzè.	
A lodge or tent	ni-ti-a	nèballè; nepalle.
A bow	alt-heikh	elthi.
An arrow	ki-e	kah.

A canoe	tri	tsi.
Good	neir-zi	nesu; neso; nazu.
Bad	bets-hè-tè	neso-ulla.
Day	tzin	tzinna.
Night	tatha	hetleghè.
Sleep	nokh-tchi	belkh.
Rest	tuggatk-ĭlla-è	thĭlleh.
To sit	tchith-u-ĕtcha	théda.
To walk	ka-whot-ĕl	nathall.
To run	sha-tocha	thebakall.
To shoot	at-ĕl-ke	thelguth.
To kill	beshei-en-i-echa	thega-thul.
A man	tenghi	’dŭnnè; duneh; ’tinnè.
A woman	tren-djo	tskēkwè.
A boy	tse-a	dunne-yazè.
A girl	mitchet-ei	tsekwe-azè.
A dog	tleine	thling; thline.
A sled	latchan-vultl	bet-tchinnai.
Numerals.		
1	tili-lagga	nthlare, D., (en-clai, L.), (sthlagi, C.).
2	nak-hei	nakkhe, D., (nakka, L.), (nakke, C.).
3	thi-eka	khtare, D., (ita-rgha, L.), (takkè, C.).
4	tān-na	tinghe, D., (iting, L.), (tingee, C.).
5	illa-kon-ĕlei	zazunlare, D., (sa-soo-la, L.), (sasulagi, C.).
6	neckhki-ĕt-hei	eleathare, D., (ut-ke-tlai, L.), (alkitakhe, C.).
		nthlazuntinghe, D.,

7	ataitsa-newk-he	(kkosing-ting, L.), (sthlasitingie, C.).
8	nak-hei-etan-na	alcatinghe, D., (elzenting, L.), (alketingie, C.).
9	nuntcha-niko	nthla-otta, D., (kkahooli, L.), (katchine-onnuna, C.).
10	tikh-lagga-chow-et-hi-en.	'nthla-una, D., (ito-nanna, L.), onnuna, C.).
11	tikh-lagga-mik-ki-tagga.	(sthlagi-juthet, C.).
12	nak-hei-mikki-tagga	(nacke-juthet, C.).
13	thi-eka-mikki-tagga	(takhe-juthet, C.).
14	tanna-mikki-tagga	(tingee-juthet, C.).
15	ilakon-ĕlei-mikki-tagga.	
20	nak-how-chow-ethi-en	(non-nanna, L.), (nackhe-onnuna, C.).
21	nak-how-chow-ethi-in-unsla-tikh-lagga.	(nacke-onnuna, nathetsin sthlage, C.).
30	thi-eka-chow-ethi-en	(tacke-onnuna, C.).
40	tanna-ha-chow-ethi-en	(tingie-onnuna, C.).
50	atla-konĕlei-chow-ethi-en.	(sasulagi-onnuna, C.).
60	nikh-ki-at-hei-chow-ethi-en.	(alkitakhe-onnuna, C.).
70	atait-sa.	
80	nich-ki-etanna-chow-ethi-en.	
90	muntcha-niko-chow-ethi-en.	
100	tikh-lagga, chow-	(onnuna-onnuna, C.),

	ethi-en-chow-ethi-en.	*ten tens*.
200	nak-kaggo-chow-ethi-en-chow-ethi-en.	(nacki-onnuna-onnuna, C.).
300	thi eka-chow-ethi-en-chow-ethi-en.	(takhi-onnuna-onnuna, C.).

Note.—The orthography of the names of numerals enclosed by crotchets is different from that of the other parts of the vocabulary. D. denotes Dog-rib words obtained by myself. L. is Dog-rib recorded by Capt. Lefroy. C. denotes Chepewyan words extracted from a list furnished by Mr. M'Pherson, who has adopted the French orthography in part.

The fragment of a vocabulary of the Chepewyan dialect, which follows, was formed entirely from the diction of Mrs. M'Pherson, to whom the language has been familiar from her infancy. It was written in the following manner: Having at hand a pretty full vocabulary of the Cree, drawn up at Carlton House in 1820, in which the words were arranged in alphabetical order, I propounded the Cree expressions to her in succession, assisting her with a French translation when she had any doubt of their meaning. The Chepewyan equivalent was pronounced by her again and again, until my ear caught the sound, and I was able to repeat it after her. I then wrote it down, and read it to her from the manuscript. Such words as I was unable to pronounce to her satisfaction, and they were not few, were left out. The nasal sounds resembling the French final *n* were the most difficult, and they are of frequent occurrence in the language. The Chepewyan tongue also abounds in the burring sound of the letter *r* combined with an aspirate, which I know not how to express in English; and such words have consequently been left out of the vocabulary. The ordinary aspirate, similar to the *och* of the Scottish or Irish, is denoted in the vocabulary by *kh*. The vocabulary, short as it is, took some weeks to produce. It was interrupted by a change in our arrangements in travelling, canoes having been substituted for boats, which made it less convenient for me to receive lessons in Chepewyan. This difficulty would not, however, have prevented the prosecution of the task, especially as Mrs. M'Pherson with much kindness expressed her willingness to proceed until we had gone through the whole Cree vocabulary, of which about nine-tenths remained; but

knowing that the language was becoming a written one, under the active superintendence of the Roman Catholic missionaries at Isle a la Crosse, I gave up my intention of endeavouring to ascertain its structure, and contented myself with the following specimen.

Vocabulary of the Chepewyan Tongue, with Cree and English Translations.

A as in "father;" *ā* as in "awe" "law;" *è* as in "theme;" *e* as in "dell" "bed;" *i* as in "ravine," or as *ee* in "see;" *ĭ* as in "ill" "ink;" *o* as in "or" "for;" *ŭ* as in "us" "husk;" *ai* as in "aim" "maim;" *au* as *ow* in "how;" *oy* as in "hoy;" *yu* as "you;" *eu* as *ew* in "dew" or *eau* in "beauty;" *kw* as in "awkward;" *ng* as the French nasal *n*; *kh* as *ch* in "loch," *Scottice*.

Cree, of Carlton House.	Chepewyan, of Athabasca.	English.
A.		
Abu-ye	tu-a-wĭll	liquor, soup, or drink.
Agatha-shu, or aggai-a-shu.	thè-ut-'tinnè	an Englishman.
Aggĭskow, or akkĭskow	el-ka-ti	pin-tailed grouse.
Aggŭsk	sis-thère	a blunt arrow.
Atchak, or akhchak	i-yu-nè	the soul.
Ai-ammi-hè-u	yu-alānè-pallè	a flag.
Akop	tsirrè, or tchirrè	a blanket or covering.
	Tsirrè-kai-cho	a large blanket.
Ai-n-wannis	yu	all kinds of goods.
Akwa-napoy-igan-askek	tillè-arakai-ĭnka	a covered kettle.
Akwatĭn	hātkin	frost.
Amĭsk	tza	a beaver.
Amis-kwa-wistè	ekhkè; tza bèkong	a beaver house.
Āmu; amo	klizè; ti-ranna	a bee.
Annèk-kutchass	tli-i; tchillè	a squirrel.

Annèk-kutchassis	tillel-kuzè	small or ground-squirrel.
Apikh-tow-kishi-kow	’tchi-èn-tizè; tchinnè-tan-ni-sè.	mid-day, or half a day.
Apikh-tow-tĭppĭskow	thir-nize	midnight.
Apisi-mongsus		jumping deer.
Apistè-shipis	él-kurrè; tchikhth-i-a-sè-akhth.	a teal, or small duck.
Apistat-tchèkus		prong-horned antelope.
Appakwa-sun	ni-pallé	a leathern tent-cover.
Appèk-kusis	kleunè	a mouse.
Appisk	tannonè-tcho, *big bird*	black or white-headed eagle.
Appistis-kis	kai-yazè; kai-gusè	a Hutchins’s goose.
Appoyè	toth; tö-a	paddle or oar.
Appoy-nask	kès	a spit.
Appŭssuk, (Pl. appŭss-ye-akhtik, or appussuyuk).	thai-ye; nepalli-tetchun (*tent legs*).	tent poles.
Miskahtuk	nepalli	a man’s legs.
Akhtai-yè (P. -wuk)	thè	a fur skin.
Ammiskwa-tai-yè	tzà-thè	beaver skin.
Askik	tĭllè	a kettle.
Aski; assiski	kwotlès	land.
Int´aski	ni-tanninnè	my native land.
Kit´-aski	na-hinnè	your native land.
Int´askinan		our native land.
	Bè-anninnè	his land.
Aski-tin-wè-as; aski-we-as.	bét; per-elinè	raw or fresh meat; flesh.
Askow-i	ten-de-ila (*ice, hard, not*); ten-nailer.	holes in the ice.
	Kin-the leuk	ice breaking up.
Assām (P. assām-uk)	akhè; akh; akhi	a snow-shoe.

Ahkik	tĭllè	a kettle, or copper kettle.
	Sampas-tĭllè	a tin kettle.
Assini	’thèkh.	
Assini-uspogan	seltu-yè-thekh; tchè-tut-thékh	stone pipe, or calumet.
Assini-watche-a	sheth; thè-she	Rocky Mountains.
Assini-poyt, or, E-askab		a Stone Indian.
Assiskè	otlès	mud or earth.
Assiske-pakwè-sigan	thlès	wheaten flour.
Assiggan (P. assiganuk).	tel	a sock, foot stocking.
Assiss-wi	ètlè	an ice chisel (*lit*. a horn).
Astu-thèggum-ik	tsi-yè	a shed in which canoes are built.
Astu-tin	tsá	ladies’ cap or bonnet (beaver).
	’Tsa-kallé	man’s hat.
Astum-astaik	tsa-ne-tum	sunshine.
Atchakht, or atchāk	thin	a star.
Atchappi	eltè	a bow.
Atchappè-kan	klewlghè-elting	a fiddle.
Atchĭmmosis	thling-yazè	a puppy.
Atekh, or attek	èt-thin	rein-deer.
Athappi	tā-bith	a net.
Athabiskow	thè-minnè-u-ye	a rocky country.
Atha-wak-kiska-mat-tinow	hokar-ritha	a very steep bank.
Athā-wastin	tethi-èl	a calm.
Athik	tsai èllè	a frog (*grenouille*).
	Tsai-el-cho	large frog (*crapaud*).
Athuskan	ta-kallè-chi-a	a raspberry.

Atchak-ash	til-chusè	a mink (*mustela lutreola*).
Attei-gan	yu	trading stock.
Attikh-hameg	thlew	white fish (*coregonus*).
Attim	thling	a dog.
Atuspi	kaithlin-sĭnnè	alder.
Āku-pusè-wĭn	thai-i	a platter.
Āpètte-kā-hĭggan	denti-lita-thil-tillè	a chest lock key (properly, but used for keys in general).
Akhàkhk (*a guttural grunt*).	hèkh	yes.
Akā-mik	nannè	across.
Akā-mik	yanna	on the other side.
Akwa-kukhtin	tit-sa	it is mouldy.
Annuteh; attè	tu-hu	now; at the present time.
Attè	kaltunè	already.
Annutch-kak-kè-sikak	ti-dzinnè	this very day.
Annutch kā-tippiskak	terri-kitha	this night.
Annu-watch-gai-as		rather long ago.
Apikh-tow	tanizè	in the middle.
Apatishew	bet-arutha	it is useful.
Appātun	bèt-taritha	useful.
Apputchiga		once on a time.
Askow	athkè	sometimes.
Astum-uspi	ekku-azè	since such a time.
Athi-mun	sutu-yè	it is difficult.
Athè-wak	ona-hadzŭn	more.
Athè-wak kishè-wak	edzun-kuthè	nearer; very near.
Athè-wak-pètsow	hona-hedza-nitha	further; very far.
Eshunila	hulè-ho	he is troublesome; badly disposed.
Ai-ā	nitsa-ula	keep it; have thou it.
Int´ai-an; or int´ai-a-	se-itza-heila; hunè-	

wā-u.	zoni	I possess it; it is mine.
Kit´ai-an	netzè	it is yours.
Ai-akuski-tè-u	petothè-karth	it has a broad bill.
Ai-āmi	yan-ilti	speak thou.
Ai-amew; ai-atchi-mè-u	yalti	he talks.
Ai-amihin	zedzun-yar-ilti	speak to me.
Ai-ami-hi-tu-tak	althlai-yalthi (*together let us speak*).	let us talk together.
Ai-ami-hi-tu-wuk	elthney-alti	they talk to one another.
Ai-ami-hè-u	yedzonne-alti	he spoke to him.
Int´ai-amin	è-āsti	I talk.
Int´ai-ami-ha-u	bedze-asti	I talk to him.
Int´ai-ami-hik	zedzun-alti	he spoke to me.
Kit´ai-ami-hik	nedzunè-alta	he talks to you.
Ekau-witha-atche-mow.	zedzun-ye-innè-alti-hila-kula.	do not tell it.
Ai-atehĕmow-akwa	nu-hei-lunè	tell us the news; relate thou now.
Ai-apè-tikā-u	peyè-onla-honnè	it is full of partitions.
Aikh-tu-kā-mik	nu-anku	another house.
Waska-iggan	yè	a house.
Wiggi		a tent or dwelling.
Ai-ish-ku-shu; ai-ish-ku-tè-u.	kalyè-ni-nan-idza	he is tired (with walking).
Ai-ish-kutan-nè-wu	kalyè-ni-tan-idza	they are tired (ditto).
Int´ai ish-kuzin	kalyè-ne ninna-chā	I am tired (ditto).
Int´ai-iskutchè-man	toth-ne-zin-alnilza	I am tired with paddling.
Kitai-iskutchè-man-nă?	teth-ne-ni-nan-ilza-uza?	are you tired with paddling?
Ai-u	nu-a-edzon-illa	he is there.
Akkushew	ey-a-hilla	he is sick or ill.

Int´akushin	ey-a-hèzlè	I am sick.
Akkustemmu	edzil	he is wet.
Int´akkusktemmun	dzedzil	I am wet.
Annĭskutāpan	chās-inninne-ai	a knot.
Anniskutāpè!	chās-nos-al!	tie a knot!
Ing´annisku-tāpan		I will tie a knot.
Gè-annisku-tā-pè-u	chās-ninne-al	he has tied a knot.
Apikh-ku-pai-u	tey-kunnè-takh	it has become loose; it is loose.
Ge-appaha	tey-kunnè-arlth; ney-ke-urth.	he has untied it.
Apith-kuna; appaha	pey-kè-urth	loose it (a knot); open it.
Nè-gè-apith-kunain	kalthonna-pey-kè urth	I have loosened it.
Ne-ge-apa-hain	ey-kè-urrth	I have untied it.
Int´apikh-tā-pă-hā-u	peino-harre-kluk	I gave him a blue eye.
Int´apikh-tā-pă-huk	zunno-arrè-kluck	he gave me a blue eye.
Apisa!	per-il-thilth!	warm it (as a garment at the fire).
Apisum	yi-èr-il-thilth	he warms it.
Sā-sey-int´apisain	kuda-ber-il-thilth	I have already warmed it.
Appi!	thein-'tă!	sit down!
Utè-appi!	ey-er-thein-ta!	sit here! (here sit!)
Appew	nèltă	he sits.
Appè-wé-ŭk	hed-nilthi	they sit.
Int´appin	thi-tā	I sit.
Kit´appin-nă?	thin-ta-uzang?	are you sitting?
Ki-wi-appin-nă?	unta-uzang	do you wish to sit?
Ashamin!	bega-van-ilchu!	give me food to eat!
Kiga-ashami-tĭn	ne-a-urchu	I will give you food to eat.
Michèma; hughès	bet-ho	meat and drink; food; victuals.

Aspun-ishew	ā-ă-ontzun	he is niggardly (of his victuals).
Assitĭnă	èltan-nilè	mingle them; add one to another.
A-sustatin		it is hidden.
Kiga-kasustatin	neeha-itus-'i	I will hide myself from you.
As-swè-tè-u	te-yè-thèlla	it is in (a bag).
As-swè-tā-u	te-yè-yèlla	he puts it in.
Int´aswetàn	te-ye-ila	I put it in.
Aswèthim	bega-etu-u-elnè	be on your guard against him.
Aswithi-min	zethè-sekor-u-elné	be on your guard against me.
Ing´aswithi-mow	pa-us-o-èlnè	I will be on my guard against him.
Atchis-chapum-wè-u	na-seil-hitchè	he gives a side glance to a girl.
Athăg-uskow	ne-etèl	it is broad.
Athin-isew; eythinisen	hung-ya; huya	he is wise or knowing.
Int´sip-gathi-nisĕn	hong-she-a	he is wise or prudent.
Athinew		he is abstemious.
Atuskè-u	è-hul-ana	he labours.
Int´atuskaim	e-walasna	I labour.
Atta-wanna! (imp.)	na-ĭnni!	barter! trade!
Ki-wi-atta-wanna?	na-ukh-uneuza?	will you barter?
Atta-wa-gun	yu	goods for trade.
Atta-thow-ki!	sel-honninnè!	tell a story or fable.
	Honnè	a story.
Attè-mishi-kā-tè-u	necha-ladi-nelthun	he grows bigger.
Attè-mi-shè-u		it grows bigger.
Atikh-tè-u	neuth-lurth	it is ripe or mellow.
Atisum	udedza	she dyes or tinges it.

Int´atisain	uridza	I dye it.
Atima-ow		he overtakes.
Int´atima-ow	ne-ni-esha	I overtook him.
Ing´atima-ow	ben-nisha-lillè	I will overtake him.
Int´atimik		he overtook me.
Int´atimahuk		he overtook me (by water).
Atimi-thowuk	nar-helteth	they fly from us (birds).
Attohu	tchirr-iltè	he is choking.
Int´attohun	tchirr-estè	I am choking.
Ki-wi-au-totè mĕmi-tĭn.	et-te-to-tin-in-ustè	I wish to be your friend.
A-wuss; a-wussètè!	nusè!	keep off! let me alone!
E.		
È-atchi-inyu-wŭkk	et-dunni-'tinnè	Indians of a strange nation.
Ek-kwă	yah	a louse.
Èpètchè-kiski-wŭkk	yelkon	dawn of day.
Èskann-shi-ka-un	edtè-thidzi	a horn comb.
Eskwai-atch-tchi-tchan.	tinnè-la-dthaille-dzilla	the last or little finger.
Esputtinow	kokkarritha	high ground; a bank (*une cote*).
Ethik-kwatin	ne-edja	hoar frost—hoar frost.
Ethiko-pew		hoar frost—rimy.
Etkikwuk	tchanti	ants.
Etiskew	èkei-ghè	foot-mark or track of an animal.
Ĕ-a-hā-u; or, ya-ha-u!	ey!	ha! (*interj.*).
E-a-kusin; thah-kusin	nedtha	light.
	Ned-tarrilla	not heavy.
E-apitch		still; quiet.

	Na teillè	it stirs not.
Èka	hila	not.
Èpètchè-kishikak		as the day was coming.
Ekushi-kak	dzithè	by day.
Kishi-kow; kisgow	dzinè	the day.
Èkospi; èg-guspi	klasing-tingè-vaiyè	at that time.
È-okwo-pŭkku	ashmoh	only that.
Eskwai-atch	no-ontè	last.
Espimmi-sik	i-yazè-bèkè	a little above.
Espimmik	bèkè	above.
Ètakkusik	thè-dzini-ghè	yesterday.
Ethipinnè-ok-tapo-an	oti-a-èlthè	truly.
Etippiskak	hedklèghè	by night.
	Dza-kin	beaver lodge.
È-aske-u	dza-kin-nannelya	he breaks up a beaver lodge.
Int´e-askann		I break up a beaver lodge.
Èkau-witha!		do not!
Entau-wi		go and open it.
E-ukh-tinnè-gatè-u	peta-harelta; peta-ha-elta.	it is opened.
E-ukhte-nammuk	peta-klell	open ye it.
E-ukhte-num		he opened it.
Nè-ukhtè-nain		I opened it.
Ètapoy-ikhta	bethna-ilkis	mix it; stir it.
Ethepo-akwow; nepo-akwow; athin-ni-sew.	huya	he is wise—knowing.
Ey-thin-akhtĕk	eln	small spruce fir (*Abies balsamea*).
Ey-thin-attu-shiship	tehith-teho	stock duck (*Anas boschas*).
Ey-thinni-kannu-shè-u	ultai-yè	a pike or jack.

Ey-thinni-mina		bilberries.
Ey-thinni-pithey-u		Canada grouse.
Ey-thin-yu (P. ey-thin-yu-wŭkk).	’dtinne	an Indian of the speaker’s nation.
Int´ey-apa-huk		he made my eye ache by a blow.
Tans-ey-sinikassort?	etla-hulyè?	what is his name?
Tans-ey-sini-kassu-yŭn?	ey-la-hunlye?	what is your name?
Tanna-si-te-kateg-oma?		how do you call this?
Init. I. sounded as *ee*.		
I-ā-pit		
Kah-nup-ātè-i-a-pit	nakith	he has an eye on one side.
Tann-ikè?	etla-djah?	what is the matter?
Tann-ikh-tè-an?		what is the matter with you?
Istè-kwa-nan; ustĕ-kwan; mistekwan.	edthi	the head.
Int´istèkwanan	zedthi-ey-a	my head aches.
Nistè-kwan	zedthi	my head.
Uta-pètchè-itotè!	è-o-kŭ-si!	come hither!
Nètè-itotè!	è-o-kŭ-si-nēk-iltkh!	go there or thither!
Tanti-wy-i-tukh-tè-an?	etla-se-nek-ăltkh?	where are you going?
TCH.		
Tchakkatinow	shethi-azè	a knoll; small hill.
Tchi-kè-kum	shith	a wart.
Tchi-tehè	’tinnila-theyl lé (*man’s toe*)	a finger.
Tchi-ka-ĕgan	thell; kong-kwi	a hatchet.
Tchi-ka-ĕgan-akhtik	thell-tchinnè	a hatchet helve.

Tcheŭk-sa-ĕgan	klell-thelth; thléh-kon	a gun flint.
Tchè-măn	tsi; alle	a canoe.
Tchi-pai (P.-pa-ŭkk)	ethi-a	a dead body; the deceased.
Tchi-pai-ŭktim		you dead dog! an opprobrious epithet.
Tchi-pai-ŭkk (*dance of the dead*).	nè-èlkai	Aurora borealis.
Petāpan	yel-kon	dawn of day.
O-wanni-wagan		dusk of the evening.
Tchis-ā-wan	pernatal	a hash, or haggis.
Tchis-kè-pi-son	dza-thulth	a garter.
Tchis-ta-bà-sun	pan-neyla; luneylè	a button; an anchor.
Tchista-sè-pŏwin	pè-o-koyl	a fork.
Tchista-ka-wè-sew	ther-onua	a wasp.
Tchista-ka-nan-wi-ship.	el-karrè (*pine-leaf duck*)	a teal (*Anas discors*).
Tchistèm-ow	sel-tu-yè	tobacco.
Tchimm-ashĕn	ned-tu-a	it is short.
Tchuk-tchuk-athu; tchuk-tchuk-ai-u.	tadzon-zellè	a blackbird (*Scolephagus*).
Tchika-wa-sis	yazè (few)	not many.
Tchi-kima	ta-tu-ahaddè	true, truly; verily.
Tchi-kima-numma?	ta-tu?	do you doubt it? it is true.
Tchi-ka-ka-win	nè-o-ka	close to the shore.
'Tchist! tchistè!	'tchu!	hist! listen! look!
Tchŭppasis	pei-yā-thi	below; underneath.
N'tchā-kā-pă-huk	dzènoy-ĭnkè	he poked it (a finger or stick) into my eye.
N'tchā-kā-pi-chi-nin	dzè-noy-èkè	it has run into my eye (a stick).

Tchèp-wow	kai-intchuthè	it tapers.
Tchès-kwă; tchès-kwa-pitta!	karrè!	wait! wait a little!
Tchitchei-mi-kŭskwè-su.	pè-'kunne-neltu-yè	he or it has short nails.
Tchika-ai-gè-u	thelth-ta-nai-ilkh-thelth.	he hews with a hatchet.
Ne-tchika-iggan	thelth-ta-nai-ilkh-thell	I hew with a hatchet.
Tchi-kè-si-sè-u	dzerè-hai-èllè	he plays at draughts.
Tchi-kè-si-sè-ă-wukk		they play at draughts.
Tchi-kwa-ha-mè-u	belekh-hered-ye	he crumbles the leaves (rubs them to powder).
Ingā-tchi-kwa-hain		I will crumble the leaves.
Tchi-pè-tŭkk-wow	tèll-klŭkk	it is light blue.
Ni-ghe-tchi-pusti-hà-u	thilk-tas	I put it with my arrow.
Wa-was-ki-shu	tsè-thil	the wapiti.
Oya-peyu-mus-tus	ettirrè-yā-nè	bison bull.
Nosia-mustus	ettirre-su-ta-ha	bison cow.
Wā-pis-tănn	tha	a marten.
Si-kāk	nult-si-ai	a skunk.
Si-ku-sew; sigus	del-kathlei	an ermine.
Winusk	tel-leh	a marmot or spermophile.
Winustè-key		a Quebec marmot.
Wapusk	sass-del-gai	white bear.
Apek-ku-sis	tlunnè	a mouse.
Shi-shi-pise	elgarrè	a teal.
Key-ask; kai-ask	bess-gai-è	a gull.
	Kallei	a plover.
	Bekh-hulla	*Salmo mackenzii*.
Okkau; uka	ettchu-è	*Dorè*.
Miki-sew	ded-donnè-tcho	an eagle.

Ahà-sew	dadsang	an American crow.
Ottoni-bis	thè-tchuthè	*Coregonus artedi* (Tullibec).
Namay-pith	till-tulei	*Catastomus*.
O-wi-pi-tchi-sis	thlu-dathé	*Hiodon*.
Nipe; nipi	tu; to	water.
The-kwus-kwun		it is cloudy.
Kŭsku-wŭnŭsk	kothè	clouds.
Kishi-kau; kis-gau; wa-pan.		day; day-light.
Ki-ki-ship	kambi	morning.
Apikh-tow-kishi-kau (*middle-day*).	tsindéssai	noon.
Pakkisimu (*sun-set*)	tchilsin	evening.
Tippis-kak; tippiskau		night.
Mistiko-tcheman	tetsin-tsi	a boat.
Wini-pègh	tu-tcho	the sea.
Thaka-stimmun-aigan.	tsini-ball	a sail.
Paskè-sèggŭn-nis	telgurthe-yaze	a pistol.
Kitchè-kuman	bèss-tcho	a sword (big knife).
Tappis-kā-gan	kothi-ghirrè	a handkerchief.
Mokasin; muskesin	ke	a shoe.
Tippiskā-wi 'peshim	eltsi	the moon.
Kesik; kishik	yaha	the sky.
Pinasi-wuk	edihi	thunder.
Wa-waskhsta-punu; owā-sāmusk.	tsinago-thethi	lightning.
Kunu; konă	yath	snow.
Miskwumi	ti-enn	ice.
Piki-sè-u (*it is foggy*)	etzil	fog.
	Hothin	frost.
	Nahalgi	thaw.
Utin; thow-tin	niltsi	wind.
Atchimow	yalthi	to speak.

	Netghin	to sing.
Ni-ku-mun		a song.
Mitzu	tchèli	to eat.
Wappamow	etethi	to see.
	Ureltha-nelsi	to hear from you.
	Su-sinnè	a great happiness.

The following words of Dog-rib were collected by myself at Fort Confidence. The want of a good interpreter caused me to discontinue the formation of a vocabulary of this dialect.

Dog-Rib Vocabulary.

English.	Dog-Rib of Fort Confidence.	English.	Dog-Rib of Fort Confidence.
A kettle	tillè.	Dressed leathern blanket.	tel.
Large ditto	tillè-tcho.	A spark from the fire.	kantida.
Little ditto	tillè-yazè.	Rein-deer tongue	et-thu.
Fire	kun.	Deer-skin hose	et-thidda.
Fire wood	sus.	Breeches	thlai-i.
Gunpowder	tel-kithe-kŭn.	Deer head	et-thi.
Shot	tel-kithé-ka.	A shoe	ku.
Shot-pouch	tel-kètha.	Cloth worn by men round the middle.	than.
Ball	tel-kethi-'tcho.	A bag	naltchè; klelthè.
No meat!	par-ulla!	A hatchet	thelth.
Dried ribs of rein-deer.	átcharna; et-chanka.	A spoon	thlus, or slus.
Water	to.	A file	kokètha.
A tin pan	thai.	Pole for hanging a kettle upon.	telle-kaiza.
A coat, or capot	i.	Buttons	pai-illa.

A blanket	zidda (tzud-di-e, Mr. O Brian).	Mittens	gis.
Indian hose	thelth.	The head	ta.
Hair	theo-ya.	The nose	tinnetze.
The beard	tarra.	The knee	et-thĕtha.
A crooked knife	bèss-ha.	An encampment	zutès.
A knife	bèss.	The encampment is distant.	in-tu-è-zutès.
A knife sheath	bess-thè.	The encampment is near.	thi-si-tè-zutès.
A fork	pakwa.	A warm woollen collar; a comforter.	kow-i-tchitha.
Snow	tzill; tchill.	One	’nthlarè.
Smoke	thlet.	Two	nakhkè.
A brisket	ana-rāne; ei yidda.	Three	khtarre.
The shoulder	ak-kànna.	Four	’tinge.
Leg bone or knuckle.	ak-kai-tchinna.	Five	zazunlarrè.
A firebrand	halai-kun.	Six	elkatharrè.
A tent	nepàlle.	Seven	nthlazintinge.
Tent poles	thai-è.	Eight	alkatingè.
Transverse poles to hang meat upon.	tanè-ai.	Nine	’nthla-otta.
Tent door	ku-latche.	Ten	’nthla-una.
Leathern door for tent.	thidai-nepàlle.		

The vocabularies which follow were made by gentlemen whose system of orthography varies more or less from that adopted in the preceding pages. The dialects of the Dog-ribs who resort to Great Bear Lake, and of those who hunt on Marten Lake and visit Fort Simpson, differ little when spoken, and offer no difficulty to an interpreter who is

acquainted with either; but many of the words have a very different aspect when written in English characters; and these tables may serve to illustrate a remark made in a preceding page respecting the difficulty which an English ear experiences in apprehending the sounds of the Tinnè languages. The Kutchin words collected by Mr. M'Murray, though not numerous, show a close affinity between the language spoken by that people and the Tinnè, and will perhaps be considered as a proof of the common origin of the Tinnè and the Kolush tribes down to the 54th parallel of latitude.

English	Dog-Rib	English	Dog-Rib
Head	bet-thi.	Go!	aga!
Neck	bdi-korh.	Come!	ya-kusi!
Tongue	eth-thadu.	Take!	hi-tcho!
Eyes	mendi.	Cut!	bekan-nèthu!
Ears	bed-ze-gai.	Bring!	si-nekai.
Nose	mi-gou.	Hunt!	no-sai.
Cheeks, chin	mi-ta.	Large	nai-tcha.
Shoulders	ai-kon-nai.	Small	ti-ula.
Thighs	ed-zaddai.	Long	nundeth.
Brisket	a-ethin.	Short	nundeth-helai.
Rump	etchin-nai.	Far	nitha.
Belly	be-tchuki.	Near	whā-yai.
Hands	mila.	Cry!	azel!
Feet	ak-kai.	Laugh!	mena-thi-ukla!
Fingers	mila-tchinnai.	Speak! or talk!	betha!
Nails	mila-konnai.	How many?	tanna-itai?
Teeth	baighu.	What do you want?	addow-adlis?
Brain	bet-the-ghu.	Heavy	tai-it.
Liver	et-hut.	Light	naikel-helai.
Heart	ed-zai.	High	yu-te-gai.
Blood	et-tillai.	Low	u-ai.
Skull	et-thi-thu-ine.	Good	naisou.
Entrails	et-si-ai.	Bad	tlenai.

Udder; milk	et-tuzai.	Fat	tlaika.
Butter	edgiddai-thlissai.	Lean	tlaika-helai.
Flour	hatai-kotliss.	Eat!	shanai-tai!
Sugar	suka.	Drink!	ath-uluston!
Tea	suka-tu (*sugar water*).	Smoke!	ustad!
Pepper	tenni-tsi.	Sleep!	notai!
Medicine	na-diddu.	Give!	mi-ne-kai!
Paper	eddithi.	Tell!	adin-dai!

The above vocabulary was formed, I believe, at Fort Simpson, by one of the Hudson's Bay officers for his own use; but, having forgotten to note the circumstances under which it was drawn up, I can give no further information regarding it.

A Vocabulary of Fort Simpson Dog-Rib, by Mr. O'Brian, of the Hudson's Bay Company.

Dog-Rib.	English.	Dog-Rib.	English.
Edza-zinnè	*Tetrao umbellus*.	Kling	dog.
Tih	*Tetrao canadensis* .	Tzus	wood fire.
Bet-theu	owl.	Tai-tchin	trees.
Thlu-ai	*Coregonus albus*.	Tzu	pine-tree.
Samba	trout.	Ki	birch.
Kazè	salmon.	Sinnai	I.
Tsai-teu	Back's grayling.	Tlinnai	thou.
Tai-tellai	*Catastomus*.	Ottinai	he.
Klogai	squirrel.	Ige	it.
Emmu-i-u-ai	*Columba migratoria*.	Edetata	yes.
Khun	fire.	Helai; Odelis	no.
Tu	water.	Id-zeunai	to-day.
Tchon	rain.	Kambai	to-morrow.
Yah	snow.	Zeunai	day.
Teu	ice.	Tethi	night.
Sa	sun.	Yakh-kai	winter.

Tethi-sa	moon.	Klukai	spring.
Thi-u	stars.	Senai	summer.
Kose	clouds.	Ai-tonkai	autumn.
E-tu-ai	girl.	Tai-chin-ala	boat.
Ah	snow-shoes.	Ki-ala	canoe.
Kai	shoes.	Tami	net.
Whoghi	snare.	Tau-ai-on	full.
Thai	sinew.	Tu-tai	empty.
Do	now.	Tlon	plenty.
Ye-won	then.	Hulai	none.
Tau-dezzei	half.	Tzuddi-è	a blanket.
Mal-lionai	rings.	Tai-si-ai	a shirt.
Hai-ai	trowsers.	Ed-geid-dai	a powder-horn.
Memba-ulai	waistcoat.	Mad-deli	buttons.
Tsi	vermilion.	Thai-on-tithei	thread.
Sat-su-wai	wire snare.	Et-thai-ai	scissors.
Sās	black bear.	Meni-di-e-dai	looking-glass.
Sa-tai-kuzè	brown bear.	Ai-tchusai	beads.
Tsa	beaver.	Ai-tai	ice chisel.
Tsa-thu-ai	castoreum.	Bai-huch	crooked knife.
Tai-tchesi	mink.	Bai-chin-ai-i	clasp.
Tzin	musk-rat.	Bed-do-ai-du	pot.
Tè-ki	wolf.	Tha	pan.
Noga	wolverene.		

The following vocabulary of the language of a tribe dwelling near the sources of the River of the Mountains, and known to the voyagers by the name of "Mauvais Monde," and of the Dog-rib dialect, was drawn up by Mr. O'Brian, of the Hudson's Bay Company's service.

Mauvais Monde.	Dog-Rib, or Slave.	English.
Thèlgai	thli-e	one.
Olki-e	olki-e	two.
Ta-dette	ti-e	three.

Tinghi	tinghè	four.
Sazelli	sazelli; lakithe, *the hand*	five.
Et-seu-ti	et-seu-ti	six.
Thlad za-di-e	han-die	seven.
Et-zan-di-e	et-zan-di-e	eight.
Et-thlei-hu-lai	ethli-e-houlai	nine.
Ken-na-tai	o-nai-u-non	ten.
El-lai-zai[94]	tel-kithi-kun	gunpowder.
Bai-ka	tel-kithi-tcho	ball.
Ni-tai-ton	thai-thi	shot.
Ai-tai-kai	sel-tu-e	tobacco.
Et-ton-nai	tel-kithè	gun.
E-tha-thai-on	hai-ko	gun-flint.
Utha	tiu-ni-e	kettle.
Thei	thei	axe.
Ai-tchut	ai-tchut	awl.
Bèss	bèss	knife.
Ta-chill-ai	et-ley-nai	cloth (strouds).
Kestu-ai	ai	coat (capot).
Theth	theth	leggings; also a belt.
	Edgiddai	powder-horn.
Kothegettai	ko-the-gat	handkerchief.
Set-tsa-tai	tsa	bonnet-cap.
Hai	kun	fire-steel.
A-tai-kai-tenney	seltu-tenne	tobacco-box.
Ta-ti-e	ta-ti	needle.
Thai-ka	ko-kassè	file.
Et-hai-ai	baith-laika	scissors.
E-kadzi	kud-dai	gun-worm.
Ai-kathai-tai	sa-kathai-tai	garters.
Klai-si	sa-tai-kai	grey bear.
U-thai	no-githi	fox.
Ustaidgè	no-ta	lynx.

Ustai	no-thai	marten.
Kasho	nom-be-ai	otter.
Wollon	teu-di-e	male moose-deer.
Intsei	teu-di-etse	female moose-deer.
Wod-su-tchu	bed-su	male rein-deer.
Wod-su-mon-bed-sai	bed-su-tsi	female rein-deer.
Kāg-kalai	kam'ba	ptarmigan.
Ogha-tchai	ogha	goose.
Ea-sai	tai-tonna-tcho	eagle.
U-ta-dja	uti	pike-fish.
Niton	monalla	white man.
Setsa-on	tchikwe	woman.
Te-sonnai	tchillawe	boy.
Klu-chu-i-nai	bai-tchinai	sled.
Sunbaddei	dsheth	mittens.

A Vocabulary of Chepewyan and Dog-Rib Words.

The Chepewyan was taken down from the mouth of the interpreter at Great Slave Lake. The Dog-rib from that of the female interpreter (Nanette) at Fort Simpson. The whole in 1844.

J. H. Lefroy.

Toronto, March, 1850.

` Broad, ‘ nasal, ’ guttural, ″ nasal and guttural.

English.	Chepewyan.	Dog-Rib.
Yes!	e-h!	
No!	he-li	he-li.
A man	denne	tchel-a-qui.
A woman	tza-qui-ie	tzek-qui.
A little girl	ett-er-e-ka	tzek-qui-azzè.
A boy	tchilla-qui-ie	tenai-u.
A little boy	tza-qui-the	tenai-u-azzè.

Father	tza-tah	tza-tah.
Mother	en-nè	en-nè.
Brother, elder	tzoon-noi	tzoon-noi.
,, younger		tzachilli.
Sister, elder	ssa-ra	sa-rah, or tza-rah
,, younger		sa-tez-zak, or tza-tazze.
To-morrow	kom pee	koume.
Yesterday	ou-ah-ta-tzenke	ye-hho-a.
Tobacco	tza-twe	tza-twe.
A knife	pa-as	pa-as.
A gun	thel-ki-the	qua-ka-he.
An axe	than-thye	qua-a-qui.
Gunpowder	thel-ki-the-c̆onne	thi-ke-e-c̆onnè.
Ball	thel-ke-the-chou	the-ke-e-chou.
Air	nutze	e-at-ti-ge.
Fire	kkon	kkon.
Water	tto	two.
Earth	wa-kklas	ko-eccla.
A fish	clou-a	clou-a.
A dog	c̆ling	c̆le.
A fox	no-ki-ki-the	e-et-tha-thà.
A buffalo, masculine	et-cherre	et-cherri.
,, feminine		,, e
Rein-deer	eet-than	et-thun (ettzae, f.
A moose	den-nee	denne-a.
Snow shoes	ah-he	a-e.
A sled	beth-chin-ne	ba-chen-ne.
A kettle	tille	than-ne.
Evening	eetzson	eya-kka-ezza.
Morning	kompe	sa-tcho.
Colours—black	tel-zonne	ta-zun.
,, white	tel-ka-ye	tel-ka.

,,	red	tel-kkosse	et-tel-kkos.
,,	green	ta-eč̀loze	ta-eck-cles.
,,	blue	not distinguished from black	ten-è-č̀lè.
,,	yellow	tel-thoi	tel-thoi.
The sun		ssa	ssa.
The moon		et-cha-aza	tthe-tha-za.
A star		thun	thun.
(The Great Bear)		(ya-ee-telli)	(ya-tha).

English	Dog-Rib	English	Dog-Rib
Snow	yya.	Nose	tze-etze.
Ice	t-than.	Mouth	tze-thả.
Numerals—1	en-č̀lai.	Ears	setz-r-rgha.
,, 2	nà-kka.	Hair	setz-thè-rgha.
,, 3	tta-rgha.	Tongue	tze-tthou.
,, 4	tting.	Teeth	tze-w-who?
,, 5	sa-soo-la.	Neck	tze-e-e-cottle.
,, 6	ut-ke-ttai.	Arm	tze-int-chinne.
,, 7	kkosing-ting.	Hand	ssa-la.
,, 8	etzenting.	Foot	tzè-ka.
,, 9	kka-hooli.	Legs	tze-thunna.
,, 10	ho-nanna.	Canoe paddle	ola; tho.
,, 20	nou-nanna.	Here	d-jahn.
Good	naa-zo.	There	a-c-yà.
Bad	naa-zo-heli; dzoun-de.	Where?	djahn-tin?
Beautiful	bur-a-oonde; tzoo-na-e-ti.	When	kkonde.
Ugly	pa-chi-ri.	Which	mee.
Large	natza-konde; in-cha.	What?	et-cloy?

Small	tzoo-ta.	To me	tzen-ez-etze.
Heavy	net-ta; hinka.	To him	ne-ghon-em-etze.
Light	hin-ka-he-li.	To you	ne-nin-etze.
Dark	tel-zen.	To us	e-e-cla-toon-nim-etze.
Bright	atz-za.	I don't understand.	nè-ad-ʿhear-des-tha-helili.
Low	ne-otzin-ik.	I don't speak Cree	(same sentence taken down).
High	tan-ne-e-tha.	I won't give it you.	na ʿrha tchou-heli.
Hard	taa-y-eet.	I will give it to you.	na ʿrha ochou-eze.
Soft	taa-yeet-heli.	What shall I give you for this?	than-etcha-na-rha-bela-hāze?
New	e-e-yes-e.	Take care	c̆a-re.
Old	e-e-ranna.	Make haste	agă̈-annitè.
Dear (beloved)	The word unknown to the language.[95]	Get out (va t'en)	or-rhink-là.
Wise	koo-rac-yon.	Where is it?	ye-in-kon-ecla?
Foolish	nà-a-ghal.	Carry this for me	sse-ragh-di-ach.
Strong	na-tz-ap.	Don't touch that	perrone-te-sonna.
Weak	pa-a-ttha-to-rghelli.	What do you want?	na-nu-ă̈t-cloy?
Right	nochnesse.	What do you want for this?	etcha-nette-ousa-nousa-ou-sinne?
Left	intzesse.	Give me a piece of tobacco.	tza-twe-tza-gan-a-two.
My friend	tza-teleg-ga.	I have no tobacco	tza-twe-ta-oo-twe.
My companion	tza-onenya.	Hold this	Ou-net-ton.

Head Eyes	tzat-the. tzen-nhae.	Whose is this?	me-dtze-hande?

[94] This word is used also by the Beaver and Thekannè Indians.

[95] I endeavoured to put this intelligibly to Nanette, by supposing such an expression as ma chère femme, ma chère fille. When at length she understood it, her reply was (with great emphasis): “I’ dit jamais ça. I’ dit ma femme, ma fille.”

EXPLANATION OF PLATES I. & II.

No. 1.

Plates I. and II. represent impressions of fossil leaves found in a bed of potter's clay, belonging to a tertiary lignite deposit near the mouth of Bear Lake River, described in vol. i. p. 190. of the narrative. The leaves must have been very numerous, and were evidently deposited quietly from water turbid with fine potter's clay, which forms the matrix. By the spontaneous burning of the adjacent seams of lignite, the fossiliferous layer has been subjected to heat of varying intensity, so that some portions are semi-vitrified and rendered hard enough to resist a file, while the greater part is in the condition of moderately baked porcelain biscuit, and in some few specimens the clay is but slightly altered.

The impressions only, and none of the substance of the leaves remain; and owing to fusion of the leaves at their margins from pressure, and the cracking of the clay matrix from heat, none of the impressions of the larger leaves are perfect in their outlines, though portions of the surface are very delicately rendered so that the minute nervation is distinctly shewn, and the existence of pubescence may be made out.

Table 1. fig. 2. is a representation of the impression of a twig which has the character of *Taxites acicularis*, (Brongniart Prodr. 108, and "Descript. Geol. des Environs de Paris, p. 362., t. ii. f. 13." *Taxites foliis sabdistichis, linearibus obtusis*). The leaf is scarcely half the length of that of *Taxus baccata*, and is decidedly smaller than that of *T. canadensis*, being generally about 0.44 inch in length and about one-fifth part as wide; or, more precisely, the breadth of the lamina is 0.09 inch, which is somewhat broader in proportion than the leaf of the common yew. The outline of the leaf is linear with a slightly lanccolate narrowing near the apex, which is rounded without any perceptible projection of the mid-rib. Yet though the matrix has rendered the most delicate impressions of the surface, an actually existing minute projection of the mid-rib may have been obscured, owing to the convexity of the lamina; for on making casts of the common and American yew leaves in Paris plaster, the acute apices of the mid-ribs were not distinctly shewn. The footstalk is as short or shorter than in the common yew, and appears to

have had the same kind of half twist which gives the distichous direction to the leaves. The surface of the lamina is slightly convex, with about as much recurvature of the edges as in the Canadian yew, and there is a regular fine undulation, or obtuse transverse wrinkling, which is perceptible in all the impressions when they are examined with a lens; but, except the straight, tapering, prominent mid-rib, there are no veins.

Owing to the distichous attachment of the leaves, the impressions of the adnate scales of the bark to which the footstalks are jointed are oblique, and the proper form of the scales is not easily determined. They do not appear, however, to have differed greatly from those of the common yew. The elevated triangular areas shewn in the stem of the figure were depressions in the plant between adjacent scales of the bark. In a few specimens the tops of the twigs are shewn to have had an arrangement similar to that of the yew. Buds are numerous in the axils of the leaves of the annotinous spray of yew, and a few impressed hollows in the fossils may have been caused by such bodies, but they are comparatively rare. More numerous small detached bodies in the matrix may have been produced by the berries or nuts of this plant. Five or six of the twigs terminate inferiorly in ovate or irregularly oval expansions, which are such as a cluster of buds situated there would produce; in only one specimen is there any appearance of the branching of a spray, and in that the seeming branch may be merely the impression of one twig crossing another.

Out of upwards of fifty impressions of twigs of this *Taxites*, eight or ten have small round depressions on some of their leaves, disposed sometimes in a pretty regular row on each side of the mid-rib, but more often they are irregular both in distribution and size. Now and then one or more of the dots approaches nearer the margin of the leaf than the others, sometimes they are seated on the mid-rib, and occasionally one dot encroaches on another. Most of the dots have a little pit in the centre, and their circumferences more deeply impressed than the area, which is often convex, though not raised above the impression of the lamina. They must, therefore, have projected above the surface of the leaf, whose cast is all that remains. These dots bear some resemblance to the fructification of a fern; but on exhibiting the casts to Mr. Brown, he at once remarked the dissimilarity of the dots to sori, in their having no perceptible connection with veins, and in the appearance of a membranous

expansion from the epidermis covering them, which his practised eye detected. On examining twigs of the Canadian and common yews I observed many sphacelated dots raised more or less above the surface of the leaves, which would make impressions very similar to those of the fossil. The dots in the recent plant occur more commonly on the under surface of the leaf than on the upper one, and are generally circular, though sometimes irregular. They are covered by the epidermis, which in the larger dots is always ruptured in the centre. I have not been able to discover their precise nature; they may possibly be caused by insects, or perhaps by the rupture of terebinthaceous collections. They do not appear to be fungi; and when the epidermis is removed, the minute cavity is found to be lined with indurated parenchyma, which, under the microscope, exhibits cells similar to those of the rest of the leaf.

Figures 2 and 3 are magnified, but the lithograph has failed in truly representing the delicate undulations of the lamina shewn in the fossil casts.

No. 2.

There are also eight or ten impressions of yew-like twigs differing from the preceding, but none of them sufficiently perfect to give precise characters. The leaves are narrower than in the former species, though generally of the same length: there is, however, more variety in this respect, the same plant containing leaves of very different lengths. They are narrowly lanceolate, tapering gradually from the base to the tip, which is acute. Instead of terminating in rounded lobes at the insertion of the footstalk, the leaf appears to be decurrent, with the mid-rib continued into the decurrent portion. The mid-rib is slender, but distinctly impressed throughout the whole length of the leaf; and the surface is less evidently wrinkled transversely than in the first species. The leaves are also more crowded and more erect, with less of the distichous appearance, and a ⅜ arrangement may be made out. Some of the sprigs are branched like those of the common yew. This plant possesses the characters of *Taxites phlegethonteus* of Unger (Plant. fossil. p. 390.). Round dots also exist in the impressions of this species, disposed as irregularly as in the preceding one, and some are visible on the decurrent base of the leaf. Part of these dots had in the original an elevated margin, a convex disk, not so high as

the margin, and a pointed central point; others have left an uniformly concave impression.

Scattered through the matrix, and often in the close vicinity of the *Taxites* twigs, but only in one instance connected with them, there are impressions of a minute fruit, such as would be made by the nut-like seed of yew, deprived of its outer investment and of the coloured pulpy calix. None of these impressions are, however, above one-fourth of the size of a nearly ripe seed of the common yew. They are compressed, ovate, and acute, without a prominent point, and all of them shew a faint furrow descending on each side from the apex, more acute than the impression which would be made by the slight ridges on that part of the yew seed, which is only very slightly compressed. Several shew indications of an imvestment at the base, and in one impression the soft integument of the fruit seems to have been pressed aside so as to allow a cast to have been made of the nut within it. This pulp enveloped the nut entirely; or, if an opening like that of the calix of a yew-berry existed, it must have been obliterated by pressure. The solitary fruit attached to a twig of No. 1, is inclined downwards on a very short fruitstalk.

No. 3.

Some imperfect casts also exist of a plant, most probably belonging to the family *Ericaceæ*, and approaching nearly to *Vaccinium*. Some of the casts shew a five-parted, or five-leaved calix, composed of thick ovate acuminate sepals meeting at the apex. In two others a berry seems to have been crushed, leaving a flat floor of minute, very numerous seeds, partially covered with integument or pulp. There are also impressions which may have been produced by an urceolate corolla. These flowers grew on short fruitstalks, springing apparently solitarily from the axils of the leaves. As far as the form of the leaves can be made out, they are linear lanceolate, narrow, but scarcely acute at the point, with a concave surface and a not very prominent mid-rib. The leaves are approximated, apparently not in any regular order, applied to the stem at their bases, and curving outwards at the tips with a sigmoid flexure. They are rather more than a quarter of an inch long, and the height of the swollen calix or corolla is about as much.

No. 4.

Plate II. is a representation of a segment of an impression of the upper surface of a palmately veined leaf, magnified to rather more than twice its linear dimensions. Though it bears a general resemblance in its nervation, and in the areolæ formed by the minor reticulating veins, to a leaf of the Maple, it differs at least as a species from the American maples with which it has been compared. Many small circular depressions of different sizes are irregularly distributed over the surface of the leaf; the more perfect of them are pitted by twenty or more minute points visible by the aid of a lens; and in some the central point is larger than the others, producing the appearance of an umbo, as in the dots of the *Taxites* figured in Plate I. These depressions were of course produced by bodies rising above the surface of the leaf and rough with little points; their unequal dispersion on the leaf, much of whose surface was smooth, is against their having been produced by hairy glands, and they were most probably moulded on fungi growing on the leaf. There are also some smaller and deeper depressions, most frequent towards the upper part of the leaf, but considerably less numerous than the larger shallow ones. Two other fragments of impressions, seemingly of the same kind of leaf, have footstalks not complete, but exceeding an inch in length. One of these, representing the upper surface of the leaf, has a few circular depressions of both kinds; on the other, which is an impression of the under surface of the leaf, there are no depressions.

None of the impressions are so complete as to give the whole outline of the leaf. The base runs at right angles with the footstalk, and is entire for nearly an inch, beyond which it is rounded off and crenated by almost semicircular, minutely apiculated teeth, separated from one another by very acute sinuses. The leaf appears at first sight to be three-ribbed, the central nerve or mid-rib being straight, and the one on each side curved, so that if prolonged they would meet the central one at the point were the impression complete. There are, however, in fact seven nerves springing together from the footstalk, the lower pair having less prominence and more the character of the secondary veins; the next pair are but little smaller than the three principal ones. On the upper surface of the lamina the main veins were concave, while the impressions of their under surfaces are sharp and rectangular. The secondary veins and ultimate reticulations were prominent on both sides of the leaf. The minute areolæ are plain and smooth, and there is no indication of any pubescence in the

axils of the veins.

Impressions of leaves from the coal beds of the Raton, in lat. 37½° N., long. 104½° W., (vide New Mexico by Emery, Abert, Cooke, and Johnston, p. 522., plate), resemble this species, but are too imperfect for identification.

No. 5.

An impression of a smaller leaf than the preceding is so like it in the character of the veins, ultimate reticulations, and general surface, that, but for a little difference in the crenatures of the margin, they might be pronounced without hesitation to be of the same species. The outline is subrotund, transverse at the base near the footstalk, and apparently entire there, crenated more irregularly and with generally smaller teeth than the preceding on the sides; and entire near the tip, which is deficient in the specimen. The diameter of the lamina of this specimen is an inch and a half. It exhibits none of the round dotted depressions, but there are some of the irregular clusters of little pits on different parts of the surface which exist in the specimen figured in Plate II. and in some other casts.

No. 6.

Another palmately-veined leaf differs from the preceding ones in the areolæ being concave above or puckered from the tightness of the veins, and in its margin being sharply toothed and irregularly crenated. Only one impression of this leaf exists in the collection, and that is imperfect, there not being enough of it to indicate the form of the outline. It does not appear, however, to have been lobed. The diameter of the lamina is scarcely two inches.

No. 7.

There is still another palmately-veined leaf very different in form from any of the others. It is one-third wider than it is long, and seems to have been rounded at the apex, which is, however, narrower than the widely rounded sides. The base is cut horizontally, and is very entire. The sides are tooth-crenated, the teeth being segments of circles, and the crenatures acute, but not deep. The footstalk is slender, and the primary veins, none of which are straight, are still more so. They spring five

together from the footstalk; the lower pair being smaller than the other three, and the mid-rib largest. They are all branched, and the ultimate reticulations are polygons of very irregular shape. The areolæ are smooth and flat. The length of this leaf is rather more than an inch.

No. 8.

The fourth palmate leaf, of which there is a definite impression, is subrotund, and about an inch and a half long, with a very entire, or at the most slightly undulated, margin. More than an inch of slender footstalk remains. The base is horizontal, with a minute curvature downwards, or decurrence where it joins the footstalk, then it is widely rounded into the slightly concave sides, and rounded again towards the point which is deficient. Five principal veins originate from the footstalk, the lower pair, which run near the margin of the lamina, being less conspicuous than the other three. The mid-rib is straight, the vein on each side of it curved in the segment of a circle; so that were the leaf complete, the three would be found to meet at the point, as in No. 4. Numerous curving and forking branches spring from all. The areolæ are of very various sizes, and their surfaces, when viewed with a microscope, are seen to be minutely granular, indicating minute pits in the upper side of the leaf.

No. 9.

Impressions of a penniform leaf resembling that of *Morus alba* in its general outline and the character of its veins, are pretty numerous. Both surfaces seem to have been quite smooth, there being no evidences of the existence of any pubescence. The central nerve or mid-rib, and the primary lateral ones, are very distinctly impressed in the matrix; and the connecting ones of the second order, which run from one lateral branch to another, are more conspicuous than those of the mulberry. They vary, from being almost straight and parallel to each other, to a greater or less degree of curvature, or even a pointed arch, in the middle of their length, and towards the margin of the leaf are branched and pass gradually into reticulations. The minor veins are much less prominent, and form minute meshes of no uniform shape, but generally oblong, and from four to eight-sided, having a strong resemblance to those of the mulberry. The minute areas are flat and smooth. The lateral veins spring from the mid-

rib in pairs, but, except at the base of the lamina, not exactly opposite to each other. From the footstalk two lateral branches spring together with the mid-rib, forming, as in the mulberry, a triple-ribbed leaf; but there is a greater fulness of the lamina there, and the nervation differs from that of the mulberry in that part, in two or sometimes three veins of smaller size originating also from the mid-rib or footstalk to supply the base of the leaf. Five, or sometimes six veins may, therefore, be said to spring from the top of the footstalk, the lower ones being secondary as to size. In the leaf of the mulberry, these smaller basal veins are branches of the lateral veins. No entire impression exists. The largest fragment must have belonged to a leaf between seven and eight inches long. The general outline seems to have been cordate, with the lobes at the base full and perhaps overlapping, and the apex acute, but not acuminate as in the mulberry. The margin is serrato-dentate above, and simply undulated, or nearly even, at the base. The teeth are generally semi-ovate with a little point, or mammillate as in the mulberry, but are not so closely set. They are somewhat unequal in size, and occasionally denticulate, a larger tooth being notched by a single smaller one. In some specimens the sinuses between the teeth are acute, but more generally they are obtuse. This is one of the most common leaves in the deposit, and one impression of it often succeeds another in layers thinner than common writing paper, and so blended together at the margins of the leaves that the impressions cannot be obtained perfect.

Fig. 1. Plate I. is intended to represent a small fragment of this leaf, drawn of the natural size, but the distinction between the secondary transverse veins and their minor ramifications has not been maintained in the figure as to size, nor are the ultimate veins shown. The teeth are more obtuse in the side of the cast which has been drawn than they appear in the layer which was removed from it, owing to the way in which the matrix has adhered at that part; but it would appear that some of the leaves varied in having more obtuse teeth, if we may judge from two other casts very similar to this one in all other respects. Upwards of an inch of petiole remains in some of the specimens.

No. 10.

There are two good impressions of another cordate leaf, which,

instead of the smooth lamina of the preceding, have the surface densely and equally covered with pores invisible to the naked eye, and which may have been produced by a close, stiffish pubescence. The outline of the leaf has been exactly cordate with a short acuminated point, and the base not so full as the preceding, but rather reniform. The point has a perfectly even edge, and the basal lobes are also quite entire; but the rest of the margin, of which only a small part is quite complete, seems to have been undulated, the projections not amounting to teeth. A straight, tapering mid-rib gives off about seven lateral branches on each side, at an angle of about 45°, not exactly opposite, but so approximated as to form pairs. The lowest pair rise more nearly opposite, but are not so much more conspicuous than the others as to give a triple-ribbed appearance to the leaf. Some of the lateral branches fork near their tips; they are all joined by transverse veins similar to those of the preceding species, and the intervals are filled up by less obvious reticulations. The lower pair of lateral branches send ramifications downwards to the basal lobes stronger than the ordinary connecting veins. This leaf is about five inches in length, and of equal or superior breadth. A small part of the footstalk only remains.

No. 11.

Another impression of a pennately-veined leaf presents a distinctive character in the fine acute reticulating veins, which are prominent in the cast of the under as well as of the upper surface of the leaf. The areolæ are flat, but traversed also by minute winding prominent veinlets, the ultimate reticulations being very minute. In the general character of the principal veins, this species strongly resembles No. 10. Of the outline, not much can be said, as only the lower half of the cast remains. About an inch and a half of broad footstalk is met very acutely by the cordate base of the lamina. The margin is cut by rather large and somewhat remote acute serratures, the first of which is about three quarters of an inch from the footstalk. The under side of each tooth of the serrature slopes gradually down to meet the much shorter upper side of the next tooth, which stands out horizontally. Each tooth is traversed by a vein of the third order, which ends in the acute point. From the fragments we may estimate the length of this leaf at five inches, and the breadth at

three.

I forbear describing other fragments, which probably represent the upper end of this leaf, as there are some differences in the surfaces of the casts.

No. 12.

A very sharp cast occurs among the others of the upper part of a leaf, which in the acuteness of the veins and their form resembles *Tilia europea*, while in its general outline and rugose surface (but not in its margin) it is similar to some of the lower leaves of *Corylus avellana*. The veins meet the mid-rib in pairs, or alternately; the lower ones are nearly straight, the upper pairs are segments of a cordate curve, concave upwards. The veins of the next order pass directly between the branches in a straight line, or with a few anastomoses, and the ultimate reticulations are minute. The lamina is prominent above, from the tightness of the principal and secondary veins, and the cast of the upper surface shows also the prominence of the minute netting, corresponding of course to furrows in the original leaf, so close as to give it a somewhat woolly appearance to the naked eye. The cast of the under surface is convex where that of the upper one is hollow, shows the ultimate ramifications of the veins less distinctly, and is irregularly dotted by punctures visible by aid of a lens, and which probably had their origin in a stiff and scattered pubescence. The axils of the veins do not appear to have been woolly. No punctures are perceptible on the cast of the upper surface. The general contour of the end of the leaf is very obtuse, and as the central tooth which ought to form the apex is broken away, we cannot determine whether it was prolonged into an acuminated point or not. The existing portion of the margin is tooth-crenated, the teeth being comparatively large and obtuse, with a minute point formed by the end of the vein which traverses each of them. A tooth corresponds to every vein that proceeds from the mid-rib, and the sinuses between are wide, shallow curves.

A second cast, which seems to be of the same kind of leaf, shews the apex rounded, without other projections than the wide and not very prominent teeth.

No. 13.

In contact with the apex of this leaf, and partly hidden by it, there is the cast of a slender seven or eight-ribbed fruitstalk with the upper part broken away. Globular depressions are situated alternately on the sides of this fruitstalk and in contact with it. They might have been produced by sessile woolly fruits of the same form with those of *Tilia europea*, and about half the size, or by little tufts of withered flowers on an interrupted spike like that of the male florets of *Castanea vesca*, but each tuft confined to one side of the fruitstalk, and not, as in *Castanea*, verticillate. The exactly globular form of the cavities seems to be more accordant with the casts of a fruit, while their rough interior must have been produced by pubescence or some other inequality of surface.

No. 14.

A rugose leaf differing from No. 12.; has pointed teeth, but the impressions are very imperfect.

No. 15.

There are two casts of a lanceolate penninerved leaf having the aspect of a leaf of one of the *Rhamneæ*. In the outline of the lamina, and the nervation, they closely resemble a leaf of the common *Alaternus*, with the exception of being only slightly cremated instead of serrated. The greatest breadth is a little below the middle, and the base is somewhat fuller than the apex, which is acute. The impressions are an inch and a half long. There is a fulness scarcely amounting to wrinkling, of the minor meshes.

No. 16.

Is the lower half of an oval leaf resembling that of a willow, with a margin entire, or indented only by small pits, which are probably the casts of minute marginal glands. The base is obtuse, the apex unknown, and the lamina flat and smooth, with a very slight prominence of the principal veins. The transverse diameter is half an inch.

There are also various fragments of impressions of ribbed grasses or carices.

The group of plants seems to be such as one would expect to flourish in the climate of Canada West, and belongs perhaps to the meiocene

epoch.

POSTSCRIPT.

The preparation of the illustrations, and other circumstances, having retarded the publication of these volumes for some months after the letterpress was ready, the delay has enabled us to learn the result of the last year's search for the lost Expedition. The first traces of the missing ships, discovered on the south side of Beechey Island and on Cape Riley, as mentioned in vol ii. p. 155., were followed up by the discovery of seven hundred empty meat-tins, and other remains, which furnish undoubted proof of Franklin's ships having wintered, in 1845-6, on the inside of the above-named Island. The tombs of three men, with headboards bearing their names and the dates of their deaths, were erected on the east side of the Island, not far from the site of the armourer's forge, an observatory or store-house, and other enclosures opposite to the anchorage. One of these men belonged to the "Terror," and two to the "Erebus," which is sufficient evidence of the presence of both ships; and the latest death supplies us with the date of 3rd April, 1846. The mortality does not exceed that of previous expeditions; and we may therefore conclude, that the Expedition was in highly effective order when it left that anchorage, with only a moderate inroad into its stock of preserved meats, the seven hundred empty tins found on the island forming but a small proportion of the 24,000 canisters with which the ships were supplied.

Captain Penny and his officers, who examined Beechey Island and the neighbourhood very carefully and minutely, believe that the Expedition did not quit its winter anchorage till the end of August or beginning of September, 1846, founding their opinion mainly on the lateness at which the ice breaks up; that much of the summer was passed there, they consider as proved by the deep sledge ruts in the shingle, which must have been made after the snow had partially disappeared, and by small patches of garden ground bordered with purple saxifrage, and planted in compartments with the native plants.

It is also the opinion of several officers of the searching party that Franklin's ships left their wintering station suddenly. The reasons assigned for this belief are, that several articles which might have been useful were left behind, and that at a look-out or fowling station, on Cape Spencer, a long day's journey from the anchorage, the lines for securing the covering of a circular enclosure, formed by a low wall of stones, had been cut, instead of having been deliberately untied, when the covering was removed, leaving the ends of line attached to the stones. The absence also of any memorandum of past efforts or future intentions, either at the stone cairn erected on the south side of Beechey Island, at the pile of canisters, or in the neighbourhood of the kitchen, forge, and other marked localities opposite the anchorage, is thought by some to be an indication of the sudden departure of the Expedition. The value of the articles left behind is too trifling to support such an inference[96] and the absence of the diligently-searched for memorandum does not seem to be sufficiently accounted for by such a supposition. The time required for calling in the parties from Cape Spencer, Caswall's Tower in Radstock Bay, and other points where they have been traced, and for embarking the instruments and utensils from the observatories and kitchen, might have sufficed for the planting of a copper cylinder or bottle, with a memorandum. That the ships drifted out unexpectedly in a floe of ice is not considered by the nautical men who have examined the anchorage to be possible. The north point of Beechey Island being connected to North Devon by a shingle beach, covered by only two or three feet of water, no pressure of ice can operate on the harbour from that direction so as to drive out vessels by the south-eastern and only navigable entrance, and it is almost certain that Franklin's ships must have made their exit by the tedious and laborious operation of sawing out.

The absence of a memorandum at the wintering station is remarkable, and, in my opinion, wholly unexplained by any suggestion that has hitherto been given by the many writers who have made their opinions known, through the medium of the periodical press. From Sir John Franklin's well-known anxiety to act up to the tenor of his instructions, combined with the expressed desire of the Admiralty, that he should embrace every opportunity of forwarding accounts of the progress of the Expedition to England, I should have thought that he would certainly have left a record of his doings at a winter station, which

he knew to be within reach of the whalers, before he commenced his voyage of the second season, in the hope of penetrating either to the south-west or northward, where he knew there would be little or no chance of finding a channel of communication, unless he succeeded in overcoming all obstacles, and pushing his way through that archipelago, which has hitherto proved a barrier to successive expeditions. And should he, as some suppose, but contrary as I think to all likelihood, have cut his way out of Beechey Harbour merely to turn his face to England, still I think he would have left some authentic record on the spot, mentioning his labours, and the cause of his return.

As there are no natives on the north side of Lancaster Strait to disturb any memorial or flag-post that may be erected, Sir John Franklin would probably not think it necessary to bury the copper cylinder or bottle containing his memorandum, but would rather suspend it in the most conspicuous way he could devise. Now, I have learnt, by experience, that the wolverene[97] will ascend trees to cut down a package hung to a branch; and that bears have similar habits was fully ascertained by Captain Austin's sledge parties. A depôt formed by Lieutenant M'Clintock on Griffith Island was entirely eaten by bears, the tin cases proving to be but a poor defence against the tusks of these omnivorous animals, who expressed their approval of preserved potatoes by the way in which they cleared out the canisters. That they would relish the pemican which was part of their spoil, might have been predicted. They did not respect even the sign-post, but overthrew it, and bit off the end of the metal cylinder containing the record.

The want of this memorial leaves us totally in the dark as to Franklin's intended course, which would in all probability have been decided upon before he left the harbour; for, from his position, he had the means of ascertaining the state of the ice both in Barrow's Strait, and in Wellington Channel. If the former was open, his course would be to Cape Walker and the south-west, agreeable to his instructions; but if Barrow's Strait was closed, as he had found it to be the preceding year, and Wellington Channel open, then he would gladly follow the latter, which one at least of his intelligent officers considered to be the most promising route of all, and which the spirit of his instructions permitted him to take, if shut out from the west or south-west.

The well-planned and thoroughly organised travelling parties of the

searching squadron, though they traced with extraordinary perseverance extensive portions of insular coast, failed in detecting any further decisive vestiges of Franklin's course. Captain Austin's two ships, with their tenders, wintered at the south-west end of Cornwallis Island, under the shelter of Griffith Island. From thence Lieutenant M'Clintock, who made the longest journey of all the pedestrian parties, setting out in spring, rounded the west end of Melville Island in longitude 114° W., and, passing over the extreme discoveries of Sir W. Edward Parry, saw distant land extending beyond the 116th meridian. The intermediate passages and bays were explored by Lieutenant Aldrich, Mr. Bradford, and Mr. M'Dougall. On the south side of Barrow's Strait, Cape Walker, and the adjoining coasts, were traced by Captain Ommaney and Lieutenants Osborne, Meecham, and Browne; Lieutenant Osborne having carried his researches nearly to the 72d parallel on the 104th meridian. This was the most southerly point attained. It lies within 180 miles of the south shore of Victoria land, and is perhaps part of the same island. Throughout the whole of the great extent of coast-line closely examined by these officers, on both sides of the strait, no traces whatever of Sir John Franklin's ships were discovered, though Lieutenant M'Clintock found the wheels of a cart used by Sir W. E. Parry in 1820, and other traces of that officer's travelling parties. The signal posts planted by the latter were thrown down by wind or animals.

Captains Penny and Stewart in the Lady Franklin and Sophia, wintered in Assistance Harbour, in company with Rear-Admiral Sir John Ross, of the Felix. The spring journeys of the two former, and of their officers, were directed to the examination of Wellington Sound. Captain Stewart and Dr. Sutherland explored the west and north sides of this inlet, their most northern points being in latitude 76° 24′ N. Messrs. Goodsir and Marshall traced its south and west sides to the 99th meridian; and both parties, from their most westerly stations, saw a navigable sea extending northward and westward, to the utmost limits of their vision. Wellington Strait, closed to the eastward and northward, opens into this westerly passage by three channels, separated from one another by Baillie Hamilton's and Deans Dundas Islands. Baring's Island lies more to the westward, opposite the middle channel. Its shores, and those of the two other principal islands, were examined by Captain Penny, who crossed over to the point of Sir Robert Inglis Bay on the

northern shore, which has been named Albert Land; and from whence he had the melancholy prospect of boundless open water, which he had not the means of navigating. A boat was transported over the ice towards it with much labour; but, the provisions of the crew running short, it was abandoned. Mr. Goodsir found a spar of American spruce, untrimmed, with its bark worn off, and broken at both ends, twelve feet long, and as thick as a man's ankle, on the shore facing the open water; also many smaller pieces of the same kind of drift wood, while none was picked up by Captain Stewart in Wellington Sound. From this fact these officers inferred, that the drift wood had come from the westward. The currents or tides among the islands at the western outlet of Wellington Strait, were at times, according to Captain Penny's judgment, not less than four knots; and the general opinion of his officers was that the principal set of the stream came from the westward, and the prevailing winds from the north-west.

Animal life was abundant in the open water, and on its coasts. Walruses were seen repeatedly in the several channels, north and south of Baillie Hamilton's Island; and polar bears were numerous and bold, so as to be dangerous to parties not well armed. Several of the bears were killed, and one of them contained an entire seal in its stomach, the practice of these voracious animals being to swallow their prey without mastication when it is not too large to pass their gullets. The walrus cannot exist except when it has access to open water; nor is the polar bear usually found at a distance from it, except in its passage from one sheet of water to another. The travellers also saw polar hares, wolves, foxes, herds of rein-deer, vast flocks of king and eider ducks, brent geese, and many gulls and other water-fowl of less utility to man. Musk oxen were seen only on Melville Island, where Lieutenant M'Clintock killed four, and might have procured more had he wished to do so.

On the 5th of September, 1850, a floe of ice at least two years old, and upwards of thirty miles in width, filled the lower part of Wellington Strait, and remained fast, though diminished in breadth, when last visited on the 24th of July, 1851. Captain Penny is of opinion that open water existed beyond it all the winter.

With respect to traces of Sir John Franklin's Expedition, beyond Cape Spencer none whatever were observed by Captain Penny's travelling parties, except a small piece of drift wood, which had been

recently charred, and had been exposed to little or no friction subsequent to the operation of fire.[98] This was found by Mr. Goodsir in Disappointment Bay, in latitude 75° 36′ N., longitude 96° W.; and I consider it to be certainly a relic of Sir John Franklin's Expedition, as these coasts are not now visited by natives, and this piece of charred wood could not have been waterborne from any great distance. It must have travelled, however, some short way subsequent to its having been exposed to the action of fire; for if it had been the remains of a fire kindled on the spot, other fragments of charcoal would have been found lying beside it. Franklin would, undoubtedly, during the spring passed in Beechey Bay, send out a party up Wellington Sound, as he would never let the opportunity escape of examining, as far as he was able to do, a route that might influence his future movements; and as the course to the westward within the reach of pedestrian parties was known, the resources of the two ships would be turned to the undiscovered way, commencing in their vicinity. That such exploring party went beyond the limits of Captain Penny's researches, I infer from neither post nor cairn marking the limit of its journey having been seen. If the same expanse of open water was visible, in 1846, from Baillie Hamilton's Island, which Captain Penny saw in 1851, we may readily conceive the efforts that would be made to carry the Erebus and Terror into it by any practicable extent of ice sawing, particularly if Barrow's Strait remained closed. The age of a floe of ice filling a strait does not indicate with certainty the length of time that the strait has been blocked up, for drift ice, loaded with the remains of several years' snow, may be carried into a narrow passage, so as to shut it up, and as suddenly removed again on a favourable concurrence of winds and tides. One navigator, therefore, may be able to sail, as Sir W. E. Parry did, nearly quite through that northern archipelago in one season, while his successors may find impassable barriers thrown across the path which he pursued, and new avenues opened. It would be unsafe, therefore, to argue that Wellington Strait is always closed, because it was choked by a floe of some age in 1850 and 1851.

By the efforts of the searching parties, which have just returned, combined with those of preceding years, all the accessible parts of the continental coast of America have been explored, and both sides of Barrow's Strait, to the further side of Melville Island, and the land

beyond Cape Walker. Land has also been traced, though only by distant view, round the bottom of Jones's Sound. This has narrowed the lines of search to two distinct points—that is, to the south west of Cape Walker, which, from its being the direction in which Sir John was instructed to go, seemed to be especially the one in which he was to be sought; and the newly-found channel opening out to the westward from Wellington Strait. It is greatly to be desired that this one may be pursued by new efforts.

Mr. Rae, in April last, was on the eve of setting out from Great Bear Lake, in the hope of crossing on the ice to Victoria Land, and of continuing his search in a boat as soon as the navigation opened. Though he may not actually attain Lieutenant Osborn's furthest, he may, under favourable circumstances, approach so near to the scene of that officer's search, or of Lieutenant M'Clintock's, as to prove, should he find no traces of the ships, that the intervening space is too confined for the seclusion of living men. Captain M'Clure, who passed to the eastward of Point Barrow last season, if he found the sea as open as the more sanguine believe it to be, may have reached the west side of Parry's Archipelago, and have spent the winter not far from the supposed outlet of Victoria Channel; and this season Captain Collinson may be sailing eastward in the same direction. It is from Beering's Straits, then, that we are next to look for tidings of great interest to the civilised world, which sympathises so universally with the efforts made to trace and relieve so many gallant victims to science.[99]

20 October, 1851.

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[96] These were an armourer's wooden stand, used when laid on its side for the support of an anvil, and when standing on its end for the insertion of a vice; several coal bags, two of them containing coal dust mixed with a small proportion of small cinders and ashes, some pieces of rope, and scraps of old canvass, and a small piece of oaken fire wood, besides many fragments of worn clothing utterly worthless. An iron stove that had been made on board ship was also found at a fowling station near the east corner of the

island, but it is stated to have been not worth carrying on board. The bird's bones remaining in the vicinity of the stone enclosure on Cape Spencer show that the sportsmen encamped there had been tolerably successful; and much small shot was found scattered among the stones with which the enclosure was paved. In the interstices of the stone wall there were many pieces of newspapers, also two bits of paper of much interest to the friends of two of the missing officers—one being inscribed with the name of Mr. M'Donald the surgeon; the other containing part of a memorandum in the handwriting of Captain Fitzjames, giving directions as to the times of recording certain meteorological observations.

[97] The wolverene inhabits the islands north of Lancaster Strait, and its recent footmarks were often seen by Lieutenant M'Clintock.

[98] A piece of elm board that had been originally coated on one side with mineral pitch or tar, and after long exposure to the weather split by an axe, was too much weathered even on the most recent surface to come within the date of Sir John Franklin's Expedition. It was found on Baillie Hamilton's Island, and must have drifted a very long way.

[99] With reference to Sir John Ross's pigeons, mentioned in a note on page 157, of Vol. II., it appears that he despatched the youngest pair on the 6th or 7th of October, 1850, in a basket suspended to a balloon, during a W.N.W. gale. By the contrivance of a slow-match the birds were to be liberated at the end of twenty-four hours.

THE END

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TRANSCRIBER NOTES

Mis-spelled words and printer errors have been fixed.

Inconsistency in hyphenation has been retained.

Inconsistency in accents has been retained.

Footnotes have been relocated and renumbered due to using a non-page layout.

Spelling discrepancies have not been corrected. For example, two spellings were used for Chipewyan and Chepewyan.

Book headings conveyed location in the text; while also being repeated. They have been converted into sidenotes; with duplication being removed.

Some table headers had large quanties of information in them. When appropriate, for formatting purposes, they have been converted into Keys above the header.

Dashes were used to indicate alignment in the original tables. They have been omitted.

[The end of *Arctic Searching Expedition Vol. 2* by Sir John Richardson]