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SKETCHES OF THE PAST AND PRESENT  
CONDITION OF THE INDIANS OF CANADA.

BY GEORGE M. DAWSON, D.S., Assoc. R.S.M., F.G.S.

It is computed that the Indian population of the Dominion at the present day numbers nearly 100,000, distributed as follows—the figures being those of the last report of the Department of the Interior:—Ontario, 15,666; Quebec, 10,917; Nova Scotia, 2,116; New Brunswick, 1,425; Manitoba and N. W. Territories, 27,308; Athabasca District, 2,398; Rupert's Land, 4,370; British Columbia, 35,154; Prince Edward Island, 296.

Constituting thus nearly a fortieth part of the entire population of Canada, the Indians would even numerically be a not unimportant factor in questions of interior policy. As the original possessors of the land, however, though possessing it in a manner incompatible with the requirements of modern civilization, and as having been at times ready to assert that ownership, even in a forcible manner, they acquire quite a special interest; even without that afterglow of romance which follows the memory of the red man in those regions from which he has already passed away.

Though in the ante-Columbian period of American history nearly all the Indian tribes and nations appear to have been either drifting or gradually extending, by force of arms, in one direction or another, as indicated by their history or traditions, their movements were neither so rapid nor erratic as those which have occurred since the old organization and balance of power began to crumble before the advance of irresistible force from

without. We may therefore trace, with some degree of definiteness, the extension of the greater Indian families as they existed when first discovered, grouping together, for this purpose, many tribes which, though speaking the same or cognate languages, and with a general similarity in habits and modes of life, were not unfrequently at bitter enmity among themselves, and in some cases had almost forgotten their original organic connection.

In North-eastern America, the great Algonkin family was numerically the most important, occupying a vast extent of country, from beyond the western end of Lake Superior, along its northern shores, to the region of the Ottawa—which appears to have been the original focus of this group of Indians—filling the great wilderness between the St. Lawrence River and Gulf and the southern part of Hudson's Bay, occupying New Brunswick, Nova Scotia and the present New England States, and stretching even further southward, to the confines of Florida.

There appear to have been seven main tribal divisions, which are said to have numbered each from 3,000 to 6,000 warriors, and are those referred to collectively by the Jesuits, who had comparatively little knowledge of the tribal intricacies of this part of the continent, as *ces grands bourgs des Naragenses*. Many of the names of these tribes and of their smaller subdivisions are still perpetuated in a more or less travestied form in the names of places; and in the history of the early days of the English colonies some of them appear continually. In addition to these, inhabiting Maine and New Hampshire, was the great Abenakis tribe, afterwards of some importance in Canadian history, when pressed northward by the disturbances incident to the establishment of the English Colonies. Closely allied to these, were the Malecetes and Micmaes of New Brunswick and Nova Scotia. To the north of the Gulf and lower part of the River St. Lawrence were a number of roving tribes, afterwards known collectively as the Montagnards; in the Ottawa region, the Algonkins proper, and further to the north-west the Chippewas or Ojibways centred, when first discovered, near the Sault Ste. Marie, whence the name *Sauteux* applied to them by the French. These last were pressing westward, waging incessant warfare with the Sioux, and gradually dispossessing them of their hunting grounds about the sources of the Mississippi.

South of the Algonkin territory was the great Iroquois nation, extending from the southern part of Lake Champlain to

Lake Erie, and including the Senecas, Cayugas, Onondagas, Oneidas and Mohawks, a fierce, intelligent, unscrupulous confederacy or league of tribes, estimated afterwards by La Hontan at 70,000 in number, warring with neighbours and extending their boundaries in every direction, their very name a terror over half the northern part of the American continent. Allied to these by blood and language, although at the dawn of history at bitter enmity with them, were the Hurons, estimated at 30,000 to 40,000 in number, inhabiting the eastern border of the great lake which now bears their name. The Neutral Nation also inhabiting the peninsula of Upper Canada, and of the Iroquois stock, were, with the Eries, destroyed by the confederated Iroquois almost before their contact with the whites, and scarcely figure in history.

Following the more fertile country of the valley of the St. Lawrence, there appears to have been an outlying member of the great Iroquois-Huron family, holding the banks of the River and present sites of Montreal and Quebec, while the Algonkians, as we have already seen, peopled all the neighbouring regions.

Such were the main features in the distribution of the Indian nations of the north-east portion of the Continent at the time when they were about to be brought into contact with a stronger external power. In regard to their internal condition and progress in the arts, notwithstanding the gloss with which time may to some extent cover these aborigines, we cannot disguise from ourselves that they were for the most part the veriest savages. The northern Algonkians were found rarely, if ever, cultivating the soil, even on the most limited scale; hunters, fishermen adding to their dietary such wild roots and berries as the country happened to afford; living from hand to mouth, with little providence even for the annually recurring season of cold; probably then, as now among the more remote tribes, not infrequently forced even to cannibalism during seasons of scarcity; wanderers, not as some of them afterwards became in the service of the great fur companies, over immense areas of the Continent, but each little tribe migrating, with the seasons, in its accustomed district, from the lake abounding in trout or white fish, to the region frequented by deer, or the rocky hills and islands where berries ripened most abundantly; battling, with scanty means, against the heat of summer and the winter's cold, and not usually living with any sense either of security in life or in

the possession of their meagre belongings; often at war, even among themselves, and their very slumbers haunted with an ever present shadow of dread; yet, withal, knowing no better state to envy, dimly looking forward to some distant future perfection, rudely imagined, in the "Happy hunting grounds"; regarding their own exploits in defence or retaliation—which had not yet paled before the greater "medicine" of the whites—as the highest expression of *good*.

The Iroquois, the Hurons and their congeners had raised themselves a little higher in the scale, adding to the uncertain pursuit of the chase the surer product of the field: they sometimes cultivated the ground, it would appear, on a pretty extensive scale, preserved their corn in granaries, and lived in permanent walled villages, situated with reference to the fertility of the soil. The Hurons alone, inhabiting, in this way the shores of Georgian Bay and Lake Simcoe, were, as we have already seen, estimated by Father Sagard at between 30,000 and 40,000 souls. Pictures of the same mode of life are found in the account of the Canadian expedition of the winter of 1666 against the Mohawks, to the south of Lake Champlain, and in Cartier's quaint and simple narrative of his first visit to Hochelaga (now the city of Montreal), which he says was surrounded with "goodly and large cultivated fields, full of such corn as the country yieldeth. It is even as the millet of Brazil, as great and somewhat bigger than small peason, wherewith they live even as we do with our wheat." The Iroquois, though thus more advanced, were in customs and modes of thought essentially one with the other Indians, and used their greater resources as a means of waging more savage and effectual war. They were a scourge to the surrounding nations, and more especially hostile to their relatives the Hurons, the Iroquets—the Indians found by Cartier inhabiting the banks of the St. Lawrence were afterwards called—and the whole race of the Algonkins. These peoples found themselves, at the time of the arrival of the Europeans, cruelly oppressed by the wars of the Iroquois, scarcely able to hold their own, and would, in the natural course of events, have been absorbed or destroyed by them, or gradually forced to retreat into the hyperborean region. The French, with whom we have more particularly to deal, like the Spaniards, constantly used the christianization and civilization of the natives as a powerful argument in favour of their exploring enterprises, and

really attempted to carry out their professions. In the early history of Canada we continually find the priest in advance of the explorer and the trader; and, though it is hinted that in some cases the traffic in peltries occupied part of the attention of the missionary, we seldom find them lending the Divine sanction to unprovoked violence or robbery.

The intercourse of the Europeans and Indians of the north-eastern portion of America can scarcely be said to have been begun by Cabot in his voyages of 1497-98-99, when he first discovered this part of the coast. With Cartier, in 1534 and 1535, in his memorable voyages up the St. Lawrence, the first real contact occurred. The natives appear to have received him often timidly, but were found ready enough to trade when friendship had been cautiously established. At the villages of Stadacona (Quebec) and Hochelaga he was received even with rejoicing, the natives bringing gifts of fish, corn and "great gourds," which they threw into his boat in token of welcome. It is evident, however, that they well understood and wished to maintain their territorial rights, for we find that when Cartier, in his first voyage, set up in the vicinity of the Baie des Chaleurs his "cross thirty feet high," the aged chief of the region objected to the proceeding, telling the French—as well as his language could be understood—that the country all belonged to him, and that only with his permission could they rightly erect the cross there. It was too, when, in 1541, Cartier attempted his abortive colony at Quebec, that the natives first manifested jealousy and a hostile spirit.

Much later, in 1607, when the permanent occupation of the country was begun by Champlain at Quebec, the erection of a fort sufficiently strong first received the attention of the colonists: showing that they did not place a too implicit confidence in the continued friendliness of the Indians toward their enterprise. The French would indeed have found the foundation of their colony a difficult matter, but for the state of the Indian tribes at the time of their arrival. The Iroquets of the St. Lawrence valley had, since the date of Cartier's second voyage, been exterminated, probably by the Hurons, and the Algonkin nations were in a state of chronic war with the too powerful Iroquois. Champlain, adopting the only policy open to him, the traditional one of intruders, allied himself, offensively and defensively, with his neighbours the Algonkins, thereby perpetuating the warfare

between these peoples, and initiating the long series of conflicts detailed in the early history of the colony, which were only stopped for a time by the peace of Montreal, in 1701, when representatives of tribes, from the Gulf of St. Lawrence to the Mississippi, to the number of 1,300 chiefs and deputies are said to have been present.

Time will not permit us, however, to trace the fortunes of the aborigines through the long period of colonial history, during which the Iroquois, allied to the English, and the Algonkins, supported and encouraged in war by the French, occupied together a position, as it were, between the blades of the scissors, in which their number and importance were continually diminishing. The history of the Indians in this period, is besides, so much that of Canada and New England that, though capable of treatment from our standpoint, it is too well known to need recapitulation here.

It has at times been affirmed that the English government did not extinguish the Indian title in Canada proper, when it took possession of the country. This is not however, strictly speaking, the case; for in the proclamation of George III, in 1763, consequent on the treaty of that date, by which Canada became finally British, the following passage, relating to the Indians, occurs:

“And we do further declare it to be our royal will and pleasure, for the present, as aforesaid, to reserve under our sovereignty, protection and dominion, for the use of the said Indians, all the lands and territories not included within the limits granted to the Hudson’s Bay Company; as also the lands and territories lying westward of the sources of the rivers which fall into the sea, from the west and north-west, as afore said. And we do hereby strictly forbid, on pain of our displeasure, all our loving subjects from making any purchases or settlements whatever, or taking possession of the lands above reserved, without our special leave and licence, for that purpose.”

Different commissions of enquiry into the condition of the Canadian Indians have since been issued from time to time, and of which those of 1847 and 1856 were probably the most important. In reference to the Indian title, the commissioners of 1847 thus state their views: \* “Although the Crown claims the territorial estate and eminent dominion in Canada, as in other of the older colonies, it has, ever since its possession of the

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\* Quoted by Hind, Canadian Exploring Expedition.

Province, conceded to the Indians the right of occupying their *old hunting grounds*, and their claim to compensation for its surrender, reserving to itself the exclusive privilege of treating with them for the surrender or purchase of any portions of the land. This is distinctly laid down in the proclamation of 1763, and the principle has since been generally acknowledged, and rarely infringed upon by the Government." These statements are interesting in connection with the difficulty—referred to further on—as to Indian title in British Columbia. In carrying out this policy, we find the Government paying sums of money to certain tribes, and providing them with annuities as their lands become desirable for settlement. The payments thus made, though often apparently large, were always small in proportion to the extent of territory ceded. The country, for instance, north of Lakes Superior and Huron remained in possession of the Ojibways till 1850, when the whole of this vast region, at least equal in extent to England, and inhabited by between 2,000 and 3,000 Indians was surrendered to the Canadian Government for \$16,640 paid down, and \$4,400 in perpetual annuity. On this, the Commissioners remark: "If we considered that it came properly within our province, we should not hesitate to express our decided regret that a treaty, shackled by such stipulations, whereby a vast extent of country has been wrung from the Indians for a comparatively nominal sum, should have received the sanction of the Government." In a table prepared under the same commission is the following summary of areas of land given up, at different times, by the Indians of Canada, with the price paid to them per acre:

Ojibways, $2\frac{1}{2}d.$ per acre.....	7,373,000
“ $\frac{7}{8}d.$ “ .....	6,737,750
Ottawas, Pottawatamies, Chippewas and Hurons, $\frac{3}{16}d.$ per acre.....	2,001,078
Delawares, 2s.	
Saugeen Indians, $3\frac{1}{2}d.$ per acre.....	1,500,000
Ojibways of Lake Superior, as already given. Acreage not known.	

Average rate per acre about  $1\frac{1}{2}d.$

In view of such facts, we may well ask upon what principle they have been remunerated for their lands; certainly not by any standard either of their absolute or relative value, rather



by that of the relative ignorance of the various tribes at the time they were treated with, and the urgency of their then present wants. Looked at from this point of view, the transaction loses altogether the aspect of an equitable purchase. It must be evident that the Government, in such arrangements, does *not* fully acknowledge the Indian title, the "territorial estate and eminent dominion" being vested in the crown, and the claim of the Indians restricted practically—though not patently in the transactions as effected with the Indians—to right of compensation for the occupancy of their hunting grounds.

It is very difficult to arrive at any certain conclusion regarding the original number of the Indian population of this part of the Continent. The New England tribes are, as we have seen, said by some authorities to have each possessed several thousand warriors. The Iroquois were estimated by La Hontan at 70,000, and the Hurons, at an earlier date, at from 30 to 40,000. Garneau, on the contrary, gives, as the result of careful calculation, numbers very much smaller, and supports them by remarks on the exaggerated estimates of the notions formed by some travellers. He allows, for instance, to the whole Algonquin race 90,000 only, and to the Hurons and Iroquois together 17,000. Though the first estimates may be too great, these almost certainly err on the other side.

In the four eastern provinces of the Dominion, Ontario, Quebec, Nova Scotia, New Brunswick and Prince Edward Island, there are at the present day about 30,000 Indians, the remnant of the former numerous population. A considerable number of Indians in Quebec, and north of the settled districts, in the northern and north-western part of Ontario, still remain in a condition little, if at all, superior to that of their ante-Columbian ancestors. Their lands, unsuited for agriculture, are not coveted by the whites. They have only the advantage of a certain immunity from pillage and war, and of being able to procure from the Hudson Bay Company and other traders such articles of European manufacture as they may be able to afford. After describing the condition of these wild western tribes, Dr. Wilson, in the last edition of his "Prehistoric Man," writes of them: "It is not a little strange to find such pagan rites perpetuated among nomads still wandering around the outskirts of settlements occupied by descendants of colonists, who, upwards of three centuries ago, transplanted to the shores of the St. Lawrence the arts and

laws of the most civilized nation of Europe. The regions thus occupied by savage tribes are annually coasted by richly laden merchant fleets of Britain; and the ocean steamers have now brought within a few day's sail of Europe the outcast descendants of the aboriginal owners of the soil. But they experience no benefit from the change. The Mistassins and Naskapees exhibit all the characteristics and some of the most forbidding traits of the Indian savage. They are clothed in furs and deer-skins, their only weapons are the bow and arrow, and they depend wholly on the bow and drill for procuring fire."

With by far the greater part of the Indian population, however, this state has long been of the past. In all the provinces, save Prince Edward Island, the Indians hold reserves from the Crown. On the Island, the lands they inhabit were obtained for them by the Aborigines Protection Society and the liberality of private individuals. The Indians are considered wards of the Crown, and are in a state of pupilage, not possessing the right to dispose of or in any way alienate their lands, which are administered for them by a department of the Government. The funds available for Indian purposes, schools, missions, annuities, etc., are partly tribal, being derived from the sale or lease of Indian lands, partly general, by direct grant, or interest on the Indian fund held in trust by the Government. This fund, in the provinces of Ontario and Quebec, in 1877, amounted to over \$2,900,000; the total revenue available for distribution being over \$240,000. The sources of tribal funds are more fully specified as follows: Collections on account of lands sold, timber dues, stone dues; bonuses paid for the privilege of working timber limits on Indian reserves; rents collected from occupiers of Indian lands under lease; and smaller sums from licence fees, trespass dues, and a moiety of fines collected from persons convicted of having sold liquor to Indians.

In these older provinces, most of the Indians have made considerable material progress, and in some cases show a satisfactory desire to accumulate property and cultivate the land. By the last report of the Superintendent of Indian Affairs, we learn that the total number of Indians settled on reserves is 22,809. The total number of acres under cultivation is 60,501, houses owned, 4,347, besides barns and stables; horses, 2,741; cows, 2,360, besides other animals, ploughs, harrows, waggons, fanning mills and many other agricultural implements. It is, however, un-

pleasant to note the complaints of the superintendent that the schools are very generally poorly appreciated, but a small proportion of the children attending with any regularity.

The remnants of some of the Indian tribes of this part of the Dominion have now drifted far from their original localities. Of the Iroquois, a portion converted by the French—who established missions among them in 1657—separated themselves from their native cantons to the south of Lake Ontario, and settled on lands provided for them on the banks of the St. Lawrence, at Caughnawaga, St. Régis, and the Lake of Two Mountains. Their number at the present time (including some Algonkins living with the Iroquois at the last named place) is 2,964. The greater part of the Iroquois nation—allies, as we have seen, of the English against the French in early colonial days—were loyal to the Crown during the revolutionary war, and on the establishment of the United States many of them migrated to Ontario, under their great chief Joseph Brandt, 1785. They were accorded a reserve of about 1200 square miles, of which they now possess only a small part. These refugees number, at the present day 4,495, and are living on the Grand River, Bay of Quinté, and River Thames. Another considerable band of the Iroquois, chiefly composed of Indians of the Seneca tribe, still inhabit a portion of their original territory in the State of New York, possess a reserve of 66,000 acres, and are good and prosperous farmers. Another party, early in this century settled in Ohio, but were afterward removed to the Indian Territory to the south, and are now stated to number 240. One more small detachment, travelling westward in the service of the fur companies, now frequent, or lately did so, the eastern base of the Rocky Mountains, near the head-waters of the Saskatchewan.

The once powerful nation of Hurons or Wyandots, are now reduced to a mere handful. In 1648, the Iroquois recommenced their war against these people with unwonted fury, and during 1649 and 50, they were finally beaten and as a nation destroyed. After the attack of 1648 the remnants of the tribes found refuge for a time among the neighbouring nations, but were shortly afterwards again gathered together, to perish, for the most part, some by renewed attacks of their enemies, others by famine, during the winter of 1649-50. The survivors, about 300 in number, under the guidance of the missionaries who had been labouring among them, migrated eastward, but were apparently

pursued by misfortune. Many perished in attempting to cross from their place of refuge on Isle Joseph to the mainland, others were cut off by prowling Iroquois. The miserable remnant crept through the wilderness of the upper Ottawa to Montreal, and then to Quebec, where for years they inhabited the Isle of Orleans; but still, from time to time harassed by their enemies, moved into the city of Quebec itself, and on the conclusion of peace, removed to Ste. Foye, and afterwards to Lorette, where they now are, to the number of 295. A second small fraction of the Hurons, centering for a time about Detroit, were accorded a reserve at Anderdon in Ontario, but during the present century, have declined from 200 to 76 in number. Still another colony became possessed of lands in Ohio, ceded these lands to the United States, in 1832, and were removed to Kansas, where, in 1855, many became citizens, and the land being divided among these, the remainder were again removed to the Indian Territory, where they now number 258 souls. Such has been the fate of these cultivators of corn and tobacco, the natives, of all others of the northern part of the Continent, most nearly attaining a civilized state.

The vicissitudes to which the Algonkins have been subjected are not so great. Those who have come within the influence of civilisation occupy a great number of small reserves and villages scattered through Ontario and Quebec. The Abenakis, the constant allies of the French, leaving the northern part of New England, now reside at St. Francis and Becancour, and have decreased from 1000, the number remaining in 1760, to 335.

If we had any satisfactory means of estimating the real amount of Indian blood represented by the peoples classed as Indians, we would find the recognized remnant of the native race a much smaller fraction than it appears in the census. In many of the bands scarcely a pure-blooded Indian can be found, and in all great admixture has occurred. Of the Abenakis Father Marquette writes: "Our Indians are, with but very few exceptions, métis, or half-breeds. Here I do not know one Abenakis of pure blood: they are nearly all Canadian, German, English, or Scotch half-breeds. The greater portion of them are as white as Canadians, and the dark complexions we see with many are owing in most cases to long voyages." The Hurons of Lorette can scarcely be distinguished as Indians. They have almost entirely exchanged their native tongue for the French patois, and

would probably long since have ceased to be known as such, but for their claim to share in the distribution of certain tribal funds administered by the Government, which have now ceased to be of real benefit, and act instead as a deterrent to the complete independence and self-reliance of the members of the community. *Similar statements might be made with regard to other tribes, and many of the more advanced Indians begin to show a wish to emancipate themselves from their state of pupillage. This they are now enabled to do on easy terms by the Act of 1876.*

The discovery of the great North-west and contact of its Indian tribes with the whites did not occur till long after that of the older provinces of Canada; and our knowledge of the west coast and British Columbia is almost an event of yesterday. The famous journey of Joliet and Marquette to the Mississippi was made in 1672, followed, ten years later, by that of La Salle. In 1727, a Canadian fur company had advanced trading posts to Lake Pepin on the Mississippi; but we find Charlevoix writing from Montreal, in 1721, with nothing more definite than the vague rumours of the existence of the "Lac des Assiniboils" and surrounding region now forming part of Manitoba. Not till 1731 was this country and the valley of the Red River of the north, discovered by Varennes de la Verandrye, accompanied in his expedition by his sons, and a missionary Jesuit. By 1748, the French, with the wonderful energy in discovery characteristic of them at this time, had pushed their explorations far up the valley of the Saskatchewan; and they had already crossed the water-shed separating this valley from the Arctic basin, when Sir Alexander Mackenzie, an officer of the North-west Fur Company of Canada, in 1789, began his voyages of discovery in that region. This intrepid traveller, in that year, traversed the entire length of the river now bearing his name, reaching the Frozen ocean, and, in 1793, only 85 years ago, was the first European to set foot in the great interior of British Columbia.

The wide-stretching Algonkin family of Indians already described as filling so large a part of North America, extended far into the western country. The Sioux, touching, in the early historical years, the west end of Lake Superior, were then being dispossessed of these regions, and their hunting grounds about the sources of the Mississippi by the Algonkin Chippeways, who before settlement began in the Red River valley appear to have usurped a part of that region, and the Lake of the Woods coun-

try, and made of them their western stronghold. With fish and berries in abundance, and lake strung to lake, forming an amazingly complicated water communication through all the forest country, the woodland Indian may here be seen to the greatest advantage; and, as in the summer he lazily paddles his bark canoe from island to island, sets his nets in the narrows, or joins in the harvesting of wild rice in the creeks and swamps of the lake margin, one may still almost imagine that his tenure is undisputed, and his life a realization of Hiawatha. But winter is at hand, and many too are the legends still associated with the landscape of fierce conflicts, and massacres by the dreaded Sioux.

West of the Chippeways, but inosculating with them, and spreading far up the valley of the Saskatchewan, were the Crisneaux or Crees, who speak a language only dialectically different from that of the Chippeways, but exhibit some different traits, being in great part *Plain Indians*. South of the Crees, and inhabiting the river of the same name, were the Assineboines, a tribe which separated from the Dakotas or Sioux, almost within the limit of authentic history, and, like the parent stock, differed much in physical characteristics, and altogether in language from the Crees. Though thus the offspring of the Dakotas, they were bitterly hostile to them, much as occurred further east with the Iroquois. South and west of these, but scarcely stretching far north of the forty-ninth parallel in early times, were the various bands of the Sioux, or Nadouessioux of the early travellers, the first name, by which they are now most commonly known, being an abbreviation of the second, which is a Chippewa word, meaning enemies, and was sometimes also applied by these people to the Iroquois; the Sioux calling themselves Dakotas. Still farther west were the different tribes of the Blackfoot confederacy, roaming between the head-waters of the Missouri, the Rocky Mountains and upper Saskatchewan.

The Indians thus classified according to race, were, however, naturally divided, from the earliest times, by the character of their environment, into two great groups,—those of the plains and those of the forests. The former, typically exhibited in the Sioux, Assineboines, and Blackfeet, were and are physically and mentally better developed than the latter. Their lives were more active, and, with abundance of food in the innumerable herds of buffalo which then covered the plains from the Red River to the foot of the Rocky Mountains, while fierce, treacherous and

turbulent, they had leisure to develop some of the better qualities often attributed to the American savage, and to invent those curious mystic ceremonies appropriate to the seasons, which among the Mandans of the upper Missouri, according to Catlin, had assumed great complexity and an elaborate symbolism. The *plain* Crees, or those inhabiting the northern margin of the prairies, were not so warlike nor physically so well formed as their southern neighbours, though, coming first in contact with the whites, and supplying themselves with fire arms, then *uukuowa* to the wilder tribes, they were for a time able completely to turn the tables on their ancient enemies, and carried their conquests far and wide. At the present day matters are again reversed, for the Crees, still supplied by the Hudson Bay Company with the venerable flint lock musket, meet the southern tribes who trade on the Missouri, and are frequently able to afford to arm themselves with the best breech-loaders. In this region, one may see in a single tribe every stage in perfection of arms exemplified, from the bow with arrows tipped with hoop iron to the Winchester-Henry repeating rifle. It is worthy of note, in this connection, that while the Indians may be much more formidable with improved rifles, I have heard them complain that they are really more at the mercy of the whites, for, on the outbreak of hostilities, measures are taken to prevent them from obtaining suitable cartridges, which they are, of course, utterly unable to make for themselves. The woodland or *thick-wood* Crees much resemble in habits and appearance the other western tribes of the Algonkians.

North of all these, is still another entirely distinct family of Indians, the *Tinuch*, *Athabascans*, or *Chipewyans*. These inhabitants of the true "Wild North Land," are divided into many tribes and sets, speaking dialects more or less diverse. From Churchill and the western shores of Hudson Bay they stretch northward to the *Esquimaux* of the Arctic coast, people the valley of the *Mackenzie*, the great almost unknown interior of *Alaska*, and southward in the interior region of *British Columbia* as far as the *Chilcoit* River. Remnants of the same people are found scattered among other tribes far to the south, giving rise to interesting questions as to their pre-historic distribution; but the region still entirely occupied by them in the north is truly vast, being not less than 4,000 miles in extent from south-east to north-west. Within their domain are the *Barren Grounds*,

traversed and described by Sir John Richardson, Franklin and Back, a picture of bleak desolation, yet in their grassy savannahs supporting cariboo and other game enough to maintain the wandering bands of natives. They are as yet the undisputed possessors of the great Peace River valley, in Mackenzie's time abounding in buffalo and elk, and destined, at no very distant date, to form a wealthy province of the Dominion. North of this, in the Athabasca-Mackenzie region they roam over a whole continent of barrens, scrubby forests, wide muskegs, and inosculating systems of lakes; while in the northern interior of British Columbia and Southern Alaska they own a veritable sea of mountains.

Resembling the forest inhabiting tribes of the Algonkins in many respects, they yet differ from them in some important points. The name Tinneh or Dinne means simply *the people*, and in combination with some peculiar affix forms the distinctive name of almost every tribal subdivision of the race. In thus speaking of themselves as pre-eminently *the people*, they are not peculiar, but follow the custom of many of the American tribes of different family relationships. When discovered, the Tinneh were constantly at war with all the surrounding nations, including the Esquimaux, to the north, the Crees and southern Indians of British Columbia, to the south, and were, besides, engaged in intertribal wars within their own territory. They do not appear, however, to be in general distinguished for bravery or success in their warlike expeditions. Though scattered over so great an area of country, they show a close general resemblance in customs and disposition. They do not cultivate oratory to the same extent as the southern Indians, nor have they any regard for the truth, though, curiously enough, remarkably honest, both among themselves and towards strangers. They are, however, accomplished and persistent beggars. They already begin to cultivate the ground to a small extent around some of the forts and missions in the southern part of their country, and though generally lazy, when once embarked in a voyage or other enterprise, as a rule, work well. They seldom indulge in a plurality of wives.

Omitting mention for the present of the remaining Indians of British Columbia, such are the great divisions by race of the nations of the North-west. The Esquimaux, living along the whole Arctic sea-board, are never likely to come in conflict with the whites, and, from the inhospitable nature of their country,



will always remain secure in the possession of their lands. Of more practical importance, however, than this family grouping is the division into Indians of the plains and those of the forests and northern country, as already pointed out. The tide of settlement has already begun to flow, which in a few short years will cover the portion of the Great Lone Land inhabited by the prairie tribes, with farmers and stock-raisers; and it is in disposing equitably and amicably of the claims of the plain Indians, and in providing for their honest and peaceful support when the buffalo, their present means of livelihood, shall have passed away, that Canada will find her greatest Indian problem. In contrasting the Indian policy of the United States and Canada, it is unquestionable that the latter has generally shown consideration and friendliness toward these people; while the former, with few exceptions, has *practically* pursued a method harsh and aggressive; but it is often forgotten that the circumstances of the two countries for many years past have been very different. In the Western States the uncompromising edge of the advancing populace of Europe has been creeping across the plains—constant broils, outrages and reprisals characterizing its spread. In Canada we are only about to enter on this phase, and in no way but by great forbearance and tact can similar—though probably not so great—trouble be averted.

In 1812 Lord Selkirk founded his colony on the Red River, having acquired from the Hudson Bay Company in the previous year a grant of land for colonization; but, like the government of the Dominion at a later date, finding that he had afterward to arrange with the Indians for their right of ownership. In 1817, several chiefs agreed to give to the King, for the use of the Earl of Selkirk, a tract of land bordering the Red and Assiniboine Rivers, as far back on each side as a horse could be seen under (*i. e.* easily distinguished); but we find that it was afterwards made a subject of complaint by the Indians, that they never received for the land more than a first payment, which they considered as preliminary to a final bargain. The quit-rent was understood to be 100 pounds of tobacco, paid annually to the chiefs.

Selkirk's colonists, entering the country by way of Hudson Bay and the Nelson River, were chiefly men from the northern islands of Scotland, and there mingling with French-Canadians—old voyageurs of the fur Companies—soon, like these people,

took to themselves Indian wives, usually from among the Crees. Thus arose the Metis or half-breed population of the Red River, for a long time hunters rather than farmers, and as yet—especially the French half-breeds—in too many cases making but a half-hearted attempt at the cultivation of the soil. Yearly expeditions on a great scale—of which we have all read—were made by these people against the buffalo, in early days abounding in the Red River valley itself. Gradually, however, under the attacks of the people, the increasing demand for robes in all quarters, and the quantity of pemmican required by the Hudson Bay Company for the supply of their posts, the great northern herds of buffalo were thinned, and year by year the Red River hunters had to travel farther in search of their game. At last the connection between the Peace River herds and those to the south was broken along the line of the Saskatchewan, and the former all but annihilated; and at the present day a wide belt of country near and south of the Missouri, separates the buffalo still remaining in the South-Western States from those of the north, which are congregated in a limited area near the foot of the Rocky Mountains in the British possessions, and surrounded by a cordon of hungry savages. With this change, a great alteration in the position of the various Indian tribes has occurred. The Assineboines and plain Crees have followed the retreating herds to the south and west, while the thick-wood Indians, formerly confined to their forests by the pressure of these tribes, have issued on the plains; and natives from the vicinity of the Red River and great lakes of Manitoba may now be found even to the Coteau of the Missouri. The remaining buffalo at the present time inhabit a portion of the territory of the Blackfeet; but those Indians do not, now, in the absence of valuable game, try to maintain their former extensive boundaries, and are hemmed in by their hereditary enemies the Sioux and Assineboines to the east, and Crees to the north. In 1874 I met a large camp of Cree Indians on the Milk River at the 49th parallel, a point farther south than I know them to have attained before. In this year, basing my estimate on the information obtainable in the country itself, I ventured to state that the northern herd of buffalo could scarcely maintain its existence as such for longer than twelve or fourteen years, and that at or before that date the trade in pemmican and robes would cease to be of importance. Unless the regulations adopted by the North-

west Council are very strictly enforced, and possibly even in spite of this check, the buffalo must become practically extinct within a very few years. In view of these facts, measures cannot too soon be taken to render the plain tribes self supporting, on some other basis than that afforded by the chase of the buffalo. Their wandering habits unsuit them for agricultural pursuits; but some of them already possess considerable numbers of horses, and, by encouraging them in stock-raising, and especially in the introduction among them of cattle, from which, under proper regulations, they might derive a great part of their food, a solution of the problem might be found. This, at least, is the only easy transition from their present condition as hunters to a more civilized state; and if this can not be made to succeed, they will for the most part, and at no distant date, be thrown as paupers on the State.

The Indians of Manitoba and the North-west Territory, in the Report of the Minister of the Interior for 1877, are stated to number about 27,308; to which must be added about 1,500 Sioux, refugees from the south, implicated in the Minnesota massacre of 1862; also, for the Athabasca District and Rupert's Land, 6,768 (probably an under-estimate); and now, it would appear Sitting Bull and his compatriots, who, though Sioux, do not represent any particular tribe of that nation, but the disaffected and outlawed members from many bands. Since the acquisition of this territory by the Dominion, seven treaties have been concluded with the Indians, by which, collectively, nearly all the land likely to be given for permanent settlement has been ceded. The last of these was that with the Blackfeet, covering an area of some 35,000 square miles in the south-western corner of the territory, inhabited now by about 5,000 Indians; this nation having been reduced by about one-half during the last twelve or fifteen years by bad whisky, murders, and small-pox.

The general principles on which these treaties have been framed are:—The entire surrender of the territory, a reserve being provided for the Indians, and it being understood that they may continue to hunt and fish as before, without restriction as long as the lands are unoccupied; the establishment and maintenance of schools; the payment of an annuity of a few dollars to members of the tribe, a census being taken in the first instance; the yearly distribution of ammunition, twine for nets, etc., to a stated amount; and the presentation of agricultural

implements, cattle, etc., once for all, to bands settling down to farm; also the payment of a salary to the chiefs and their headmen; and the presentation of medals, flags, and a bonus in money on the conclusion of the treaty. No one who has not had some experience in dealing with Indians can realize how great the difficulty in concluding such arrangements with them is: how much talking and iteration is required, and how long they take to deliberate and discuss among themselves the propositions as they understand them; the most trivial point occasionally appearing, for some incomprehensible reason, to assume the greatest importance.

The half-breeds of the Red River have already been alluded to, and nowhere on the North American Continent is the result of the mingling of the European and native races so clearly seen as in our North-West Territory. In what is now the province of Manitoba, a separate race of Metis has grown up since the date of Lord Selkirk's colonization, and these people, holding themselves to some extent aloof from the whites and Indians, are recognized in the terms of confederation of that province, and granted large tracts of land as reserves for themselves and their children. At the erection of the province, the half-breeds numbered, according to the census, 9,770; but this, according to Prof. Wilson, was afterwards found to be an underestimate. While some of these people are scarcely distinguishable from Europeans, others are to all intents and purposes Indians, and it is curious to find in the report of the payment to Indians under Treaty No. 4, that great difficulty was experienced from the number of half-breeds ordinarily recognized as such, who desired to be included with the Indians and draw annuities. In this connection, Mr. G. W. Dickenson remarks: "The question as to who is, and who is not Indian, is a difficult one to decide: many whose forefathers were whites, follow the customs and habits of the Indians, and have always been recognized as such. The chiefs Côte, George Gordon, and others, and likewise a large proportion of their bands, belong to this class. A second class has little to distinguish it from the former, but has not altogether followed the ways of the Indians. A third class, again, has followed the ways of the whites, and has never been recognized or accounted among themselves as anything but half-breed."

When the buffalo retreated so far in the west that it became inconvenient to carry on the hunt from the Red River, a portion

of the half-breeds to a great extent relinquished this mode of subsistence; while others, among whom those speaking French are in the majority, continued to follow these animals,—selecting wintering places far out on the plains, and returning to the settlements only occasionally, with the products of the chase. These hunting half-breeds form—or formed a very short time ago—a body partaking of the character of a tribe among the Indians. They are generally accompanied by a priest, who, in concert with some of the older men, frames rules for the guidance of the camp, administers those which have already become fixed by use in the community, and decides the camping places and dates of movement of the camp, in conformity with public opinion. In the far west these people seem generally to have allied themselves with the Sioux against the Blackfeet, but gave to their allies only so much material assistance as to ensure the continuance of their useful friendship. In July, 1874, I came upon the “Big Camp” of half-breeds near the Milk River. It consisted of over two hundred tents of dressed skins, or canvas. Every family possessed Red River carts at least in equal number to that of its members. These, with the tents, are arranged in a circular form, on camping, to make a *corral* or enclosed space for the protection of the horses. It was stated that about 2,000 of these animals were owned by the half-breeds of the Camp. The Indians, as a whole, are jealous of the half-breed hunters, understanding well that their business-like manner of pursuing the buffalo for robes, not only drives these animals from their feeding grounds, but aids largely in their extermination. The late ordinance of the North-West Council, above referred to, will probably, by the restrictions it imposes, break up this half breed tribe and drive its members to other pursuits. It is certain that the Metis, as a whole, will continue to approximate more completely to the whites both in appearance and manners. Physically they are robust, and possess great power of endurance, though *not infrequently liable to pulmonary complaints.*

In British Columbia, where, in the absence of a trustworthy census, the native races are roughly estimated at 30,000, Canada has her latest, and, what appeared, for a time, likely to be her most vexatious “Indian Problem.” Races of the Tinné stock inhabit, as we have already seen, the whole northern interior of that country, extending, southward, to the Chilcotin River in latitude 52°. Bordering these on the south, and occupying

part of the province, are Indians belonging to the *Shuswap* or *Selish* connection, divided into many tribes, bearing different names, but all allied in language, the differences between the dialects being generally not so great as to prevent intercommunication. In a region physically isolated, in the extreme southeast, are the Kooteney Indians, who appear to differ from all the rest, and are perhaps more closely allied to the Indians of the interior plains, whither they resort, at certain seasons, for the purpose of hunting the buffalo. Along the coast, and on the outlying islands, are scattered a great number of tribes differing more or less, and in former years frequently hostile one to another. Into the race divisions of these it is not proposed to enter, nor indeed is it possible as yet to speak very certainly on this question. In customs, modes of life and thought, there is complete diversity between the coast Indians and those of the interior, which practically transcends the race divisions, being like to in kind, but even greater in degree, than that existing between the plain Indians and those of the woods, in the interior of the continent.

In the northern interior of British Columbia, the Indians, inhabiting a country for the most part thickly wooded, still remain, as they have always been, hunters and fishers; but in many places they now also cultivate small garden patches, producing potatoes, turnips and such other vegetables as require little attention. For their winter supply of food they generally depend chiefly on fish, which is dried and cured during the summer. On all the tributaries of the Fraser, salmon is taken, in some years abundantly. Those tribes nearer the coast, have generally succeeded in maintaining against the coast Indians, the control of some part of the various shorter rivers on which salmon can be caught. Thither they make an annual migration, which they look upon as a sort of holiday-making, revelling during the season in abundance of fresh fish, and on their return carrying back with them supplies for the cold months. They still trade with the coast tribes to some extent, obtaining fish oil and European goods for furs; and this interchange, continuing since time immemorial, has resulted in the formation of well-beaten trails, of which the Bella Coola trail, and the so-called *Grease Trail* (over which, in the far north, oolican oil is packed up from the sea-board) are best known. In the last century, when direct European trade was carried on only along the coast, these interior

Indians were obliged to satisfy all their needs for manufactured articles through the intermediation of the coast tribes. This intercourse led to the general diffusion of the remarkable Chinook jargon, which can only be referred to here. In the more remote parts of this northern country, the natives have changed very little since its first discovery. In 1793, Sir Alexander Mackenzie accompanied a party of them, as they travelled toward their fishery on the Dean or Salmon River. In June, 1876, I journeyed for a couple of days with a similar party going to the same traditional locality for the same purpose, and, with scarcely a word of alteration, Mackenzie's description might have been applied. Every man, woman and child carried a "pack" of size in proportion to their strength, many of the women being, in addition, encumbered with infants, and even the dogs having strapped to their backs a proportion of the common burden of camp equipage or traps. The larger articles and provisions were usually packed in square boxes made of light wood, skilfully bent round, and pegged together so neatly that, with the addition of grease and dirt rubbed into the corners, they are water-tight, and can be used for boiling fish, hot stones from the fire being thrown in till the water is heated. Smaller loads are carried in net-work bags made of raw hide, and slung, together with a blanket, over the shoulders. All were in good humour, and it was with the greatest difficulty I could persuade one to leave his companions to guide me to the southward, where I wished to go. They travelled at leisure, frequently resting for an hour or so, the women attending to their children, the men sleeping in the shade, or gambling with marked sticks, as Mackenzie describes.

In the southern part of the interior, the Indians have come much more freely in contact with the whites, and though many never saw a white face till the gold excitement of 1859 occurred, they have already advanced very materially. In the early days of gold mining, labour was scarce and in great demand, and, consequently, every Indian who could and would work was employed at high wages. From this, many of them became stock-raisers to a small extent, river boatmen, and packers; while others cultivated the soil, sometimes producing more than they required for their own support. Such is their state at present, and on them most of the white settlers rely for aid in tilling, harvesting, and stock herding. While, however, the younger

men take readily to these pursuits, many of the older still prefer to live as they did formerly, chiefly on the products of the fishery and chase; and in districts where settlement has not yet penetrated, whole bands still trust almost entirely to these, their primitive means of support.

Along the coast, the natives are, and always have been, almost exclusively fishermen. They hollow from the great cedar trees graceful and sea-worthy canoes, in which they frequently make long voyages, and formerly, in some cases, ventured far from land in pursuit of the whale. Their villages are along the margin of the sea, on a coast generally rocky and rugged, with little arable land. They engage in the chase to a very limited extent, and seldom even venture far into the dense forests, of which they appear often to entertain a superstitious dread, peopling them in imagination with monstrous and fearful inhabitants. Along many of the estuaries and harbours are long lines of shell-heaps, evidencing the indefinite antiquity of their feasting and camping. At the present day, many of the coast Indians are moderately industrious, working on farms, in the coal mines at Nanaimo, or as sailors in small coasting schooners. In Mr. Duncan's charge, at Metlakatla, in the north, is an example of a self-supporting and comfortable community, the result of genuine missionary labour.

Of all the coast tribes, the Indians of the Queen Charlotte Islands are probably the most intelligent and competent. When the earlier navigators visited this region, they were the sea-dogs of the coast, and carried their piratical expeditions far and wide, often engaging in fierce conflicts with the Ueultas, and other tribes who attempted to bar their passage of the narrows at the north end of Vancouver Island. Though, like most of the sea-board tribes, in features remarkably coarse, they are lighter in complexion than the others, often so much so that a rosy colour is discernible in their cheeks. Their superior attractions in this respect have been unfortunate for them, as many of their women resort to Victoria and other towns for the worst purposes, and, owing to disease, they are rapidly diminishing. Their tribal name is *Haida*, and they are remarkable above all the other Indians of the Coast for the size and excellence of their wooden houses, which are ornamented with huge sculptured posts, rising like obelisks or minarets; and also for their great skill and taste in carving in grotesque and complicated patterns all their imple-



ments and utensils. The style of this carving, on the one hand, resembles that of China and Japan, and, on the other, that of Mexico and Central America. The Haidas are dexterous and successful fishermen.

Such is a brief sketch of the Indians of British Columbia; from which, however, it will be evident that, owing to the physically diversified character of the country, and correspondingly diverse habits of the natives, they required at the hands of the whites a quite special treatment. It was probably owing to want of information that the Dominion government at first proposed to apply, unmodified, to the whole area of the new province, the traditional Canadian policy of granting extensive reserves to the natives. This led to a long, and in some instances arimonious correspondence between the general and local governments; and also to accusations by philanthropic societies, imputing injustice and indifference toward the natives to the old colonial government. It may be interesting to go over, briefly, the chief points raised in this controversy, which will also in some degree serve to explain the anomalous condition of the British Columbia Indians in respect to material progress.

Many interesting facts bearing on the first contact of whites and natives on the West Coast are to be found in the volumes of Meares, Portlock and Dixon, Cook, Vancouver and other early explorers; and various arrangements and treaties were made in these early times, which have long since, however, lost all force, and must be omitted here. Among the official documents relating to more recent times, we first find fourteen treaties concluded with the natives by Mr., afterwards Sir James, Douglas, acting for the Hudson Bay Company. These apply to Vancouver Island, chiefly to its southern and south-eastern part, and are dated in 1850 and 1852, several years before the gold excitement of 1858-59. A lump sum was paid on the conclusion of each treaty, which was looked upon as a sale, under the following conditions, to quote from one of them, viz:—"That our village sites and enclosed fields are to be kept for our own use, for the use of our children, and for those who may follow after us; and the land shall be properly surveyed hereafter. It is understood, however, that the land itself, with these small exceptions, becomes the entire property of the white people for ever; it is also understood that we are at liberty to hunt over the unoccupied lands, and to carry on our fisheries as formerly."

In 1858 attention was prominently called to British Columbia, owing to the discovery of gold, and the rush of miners from all quarters, and, accordingly, we find next among the papers (dated in July of that year) an extract from a despatch of Lord Lytton, as Secretary of State for the Colonies, to Douglas, then appointed Governor of the region, recommending kind treatment of the natives, and ordering that in all cases of cession of land, subsistence, in some form, should be granted to them. In September of the same year, there is a second despatch from Lytton, enclosing a memorial from the Aborigines Protection Society, which gives reasons for fearing that, the miners then flocking to the country, the Indians would be harshly treated, and advising, justly, that the native right to the soil should be recognized. In venturing to point out means of satisfying the natives, however, the Society makes various suggestions, some of which, to any one acquainted with the circumstances of the country, look sufficiently absurd. It is said, for instance:—"To accomplish the difficult but necessary task of civilizing the Indians, and of making them our trusty friends and allies, it would seem to be indispensable to employ in the various departments of government a large proportion of well selected men more or less of Indian blood (many of whom could be found at the Red River) ! who might not only exert a greater moral influence over their race than we could possibly do, but whose recognized position among the whites should be some guarantee that the promised equality of races should be realized." Red River being in actual distance and in manners as remote from Victoria as is St. Petersburg from London, this part of the scheme is, to say the least of it, visionary.

Next follows some additional correspondence between Governor Douglas and the Colonial Office in 1858-59, of a similar tenor, in which both parties agree in the advisability of endeavouring to locate the Indians in their villages, and render them self-supporting. Douglas, however, instanced as specially to be avoided, the method originally pursued by the Spanish Catholic missionaries to California, where the Indians, though fed, clothed, and taught to labour, were kept in a state of dependence, not allowed to think, act, or acquire property for themselves, and when freed from control were without self reliance, more helpless and degraded than at first. Also, that since pursued toward the same Indians by the American Congress, of supporting them at great cost by the State, the natives nevertheless rapidly degenerating.

In March 1861, the House of Assembly of Vancouver Island prepared a memorial, recapitulating the means adopted by the Hudson Bay Company to extinguish the Indian title, stating that the Indians of the Island have a strong sense of property in land, and that regions then being settled still belonged to the natives. It was feared that bad feeling would arise between the races; but the Colony, being unable to raise £3,000, which would be necessary to purchase the rights of the Indians, asked the Home Government to advance this sum, which was afterwards to be repaid by the sale of public lands. The Secretary of State for the Colonies, however, though ready enough to offer good advice, as we have seen, promptly answers this communication in a curt note, stating that the affair being purely a colonial matter, Her Majesty's Government could not undertake to supply any money.

In a voluminous correspondence, from different sources, extending from 1861 up to the date of the Confederation, it would seem that the idea of recognizing the Indian title to the whole mainland country never appears to have occurred to the authorities; but that the method adopted was to ask the Indians of any particular locality what plot of land they wished to possess, and to make this reserve for them. It generally appears that all the land asked for was given, and sometimes even more than requested, the Governor indeed expressly directing that when a larger area was requisite to the support of the Indians, it should at once be allotted to them. In most cases the natives seem to have been satisfied with this arrangement, though we discover that certain priests, missionaries among them, were already advising the Indians to make larger claims for land. It is evident, in fact, that at this time—to quote from a report by T. W. Trutch, as Chief Commissioner of Lands and Works in 1867, which, though referring specially to the lower part of the Fraser, may be taken as representing the state of affairs over the whole interior:—“The subject of reserving land for the Indians does not appear to have been dealt with on any established system during Sir James Douglas's administration. The rights of the Indians to hold lands were totally undefined, and the whole matter seems to have been kept in abeyance, although the land proclamations specially withheld from pre-emption all Indian reserves or settlements. No reserves of lands specially for Indian purposes were made by official notice in the *Gazette*, and those Indian reserves which

were informally made, seem to have been so reserved in furtherance of verbal instructions only from the Governor," or even in some cases were made over to the Indians on the ground by him personally.

About this time, it was found that many reserves made in this loose way, were seriously impeding settlement by blocking access to valuable lands, and otherwise; and, moreover, that the land locked up in reserves was frequently far in excess of the requirements of the aborigines. The authority by which many of these reserves were made, was then disavowed by the government, and, in a letter from the Colonial Secretary (Nov. 1867), the original intention of the Government is defined as having been in all cases to grant the Indians lands cultivated by them, and so much in addition as to bring the reserves up to about ten acres per adult male: it being further stated "that reserves that have been laid out of excessive extent should be reduced as soon as practicable. The Indians have no right to any land beyond what may be necessary for their actual requirements, and all beyond this should be excluded from the boundaries of their reserves. They can have no claim whatever to any of the land thus excluded, for they really never have possessed it,—although, perhaps, they may have been led to view such land as a portion of their reserve. "The Indians appear in almost all cases to have acquiesced quietly in the reduction, feeling compensated to some extent by the greater definiteness given to their claims by actual survey. They are reported in most instances to have been "well satisfied," "satisfied," or "submissively satisfied."

The whole matter of Indian lands was thus in a very unsatisfactory state to be handed over to the Dominion authorities at the date of the admission of this province (1871), for even where substantial justice had been done to the Indians, the records were indefinite, or altogether wanting. On the appointment by the Dominion of a Superintendent of Indian affairs, the misunderstanding which of late attracted special attention began, and soon resulted in the accumulation of a great number of letters, if to no more substantial issue. In the terms of union it was provided that the General Government should assume control of the Indians, and, to quote, that "a policy as liberal as that hitherto pursued by the British Columbia Government shall be continued by the Dominion Government after the Union;" further, that tracts of lands, "such as it has hitherto been the practice of the

British Columbia Government to appropriate for that purpose," shall be handed over to the Dominion in trust for reserves, etc. These provisions, while apparently guaranteeing justice to the Indians, really proved a bar to the well meant policy of the Dominion. The land grants in British Columbia were by no means on so liberal a scale as usual in the other provinces, and were, further, very unequal, being in some cases only about five acres to a family, while over the whole province the average was not more than 6 to 10 acres. The Dominion Government wished the size of reserves to be fixed at 80 acres per family. The local government proposed 20 acres, which was accepted by the Dominion for the coast, but for the interior—where white settlers are allowed to pre-empt a double quantity of land—it was wished to increase this to 40 acres. The local government would not accede to this, and it eventually appeared that they intended the 20 acre basis to apply only to new reservations, and not to lead to the enlargement of those formerly made. Dissatisfaction and agitation meanwhile arose among the Indians, who soon became aware, to a more or less complete extent, of the state of affairs. Certain missionaries get the credit of partly fomenting and rather exaggerating the difficulty, with a view of bringing about an arrangement suited to their own interests; but to what degree this may be true I do not know.

In the end, after several propositions and counter-propositions, an agreement was arrived at between the two governments, of which the following is the substance:—

A commission of three is appointed, one member by each of the governments, the third jointly. This body shall enquire into all matters connected with each band of Indians, and fix reservations, for which no standard size is given, each nation being dealt with separately, on an equitable and liberal basis. It is also provided that, in accordance with the increase or decrease of the number of Indians, the reserves may from time to time be enlarged or diminished in size.

This body has since been reduced to a single commissioner, who is superintending the allotment of permanent reserves on an equitable basis to the Indians of the province.

While, on comparing the Indian policy of the British Columbia Government with the Canadian, where 80 acres may be taken as the minimum size of reserve, the provision made for the Western Indians appears slender, it will be seen from the sketch already

given of the habits of life of the Indians, and nature of the country, that it was by no means without reason that the British Columbia Government objected to the crude application of the rule found to work well in the East, to the very different and variously situated natives of the West Coast; that, while reserves even on the 80 acre basis would be barely sufficient in some parts of the interior, where large areas are required for stock ranges, it would be useless and foolish to reserve great tracts of arable land for the coast tribes, who are by nature fishermen, and could under no circumstances be induced to cultivate the soil on any but a very limited scale. The policy obviously best for the natives of British Columbia, is to aid them in following those paths which they have taken already; to assist the tribes of the interior to become successful stock-raisers and farmers, by granting them suitable reserves and grazing privileges; to encourage those of the coast in fishing and becoming seamen, instructing them in improved modes of preserving their fish, and of preparing it for sale to others. If the sites of their villages and fishing stations are secure to them, they will require little more in the way of reserves. To grant to each family 80 acres of good land, it would be necessary to move many tribes far from their traditional haunts, and to this they would only submit under compulsion. In reviewing the state of the natives of the West Coast, it would appear that, though in many instances the British Columbia government seems to have transgressed the limits of strict justice toward them, and has departed from the precedent elsewhere established, in refusing to acknowledge the right of the Indian to the soil; that he, thrown more on his own resources, mingling among the whites with an equality of rights before the law, and exempt from the interference which has elsewhere distinctly retarded the progress of the savage towards civilization and independence, has worked out in a measure his own temporal salvation, has passed the critical stage of first contact with the whites, and in many cases bids fair, at no distant date, to form an important constituent of the civilized population of the country, and this even before the native has been largely mingled with foreign blood.

It is often said that the ultimate fate of the Red Man of North America is absorption and extinction: just as European animals introduced into Australia and other regions, frequently drive those native of the country from their haunts, and may even

exterminate them, and as European wild plants accidentally imported, have become the most sturdy and strong in our North American pastures; so the Indian races seem to diminish and melt away in contact with the civilization of Europe, developed during centuries of conflict in which they have had no part, but during which their history has moved in a smaller circle, ever returning into itself. Even the diseases engendered in the process of civilization, and looked upon in the Eastern hemisphere with comparative indifference, become, when imparted to these primitive peoples, the most deadly plagues. Dr. J. C. Nott (as quoted by Prof. Wilson), writes: "Sixteen millions of aborigines in North America have dwindled down to two millions since the Mayflower discharged on Plymouth Rock; and their congeners the Caribs have long been extinct in the West Indian Islands. The mortal destiny of the whole American group is already perceived to be running out, like the sand in Time's hour-glass." Dr. Wilson has, however, himself shown that though the Indian as such can not very much longer survive, Indian blood in quantity quite inappreciated by casual observers now courses through the veins of white persons of the continent.

The ultimate object of all Indian legislation must be, while affording all necessary protection and encouragement during the dangerous period of first contact with the whites, to raise the native eventually to the position of a citizen, requiring neither special laws of restraint or favour. When it is found that the paternal care of the State begins to act as a drag on the progress of the Indian, and that after reaching a certain stage all further advance ceases, the state of dependence must be done away with. To render this change possible, and to effect it in cases where it would already be advisable, the Dominion Act of 1876 was framed. That this measure has not been adopted too soon appears from the concurrent testimony of many interested in the welfare of the Indian, and acquainted with the working of the present system. In concluding, a few of the opinions expressed on this subject may appropriately be given. The Rev. J. Marault (as quoted by Dr. Wilson), writes:—"Many suppose that our Indians are intellectually weak and disqualified for business. This is a great mistake. Certainly as far as the Abenakis are concerned, they are all keen, subtle, and very intelligent. Let them obtain complete freedom, and this impression will soon disappear. Intercourse with the whites will develop their talent

for commerce. No doubt some of them would make an improper use of their liberty, but they would be few in number. Everywhere, and in all countries men may be found weak, purposeless, and unwilling to understand their own interests; but I can certify that the Abenakis generally are superior in intelligence to the Canadians. I have remarked that nearly all those who have left their native village, to go to live elsewhere free, have profited by the change." Dr. Wilson himself remarks (in another place):—"The system of protection and pupilage under which, from the most generous motives, the Indian has hitherto been placed in the older provinces, has unquestionably been protracted until, in some cases at least, it has become prejudicial in its influence. It has precluded him from acquiring property, marrying on equal terms with the intruding race, and so transferring his offspring to the common ranks." The Honorable Mr. Laird, when Minister of the Interior, as the result of his enquiries in connection with the Indian bill above referred to, speaks in the following terms:—"Our Indian legislation generally rests on the principle that the aborigines are to be kept in a condition of tutelage, and treated as wards or children of the State. The soundness of the principle I cannot admit. On the contrary, I am firmly persuaded that the true interests of the aborigines and of the State alike require that every effort should be made to aid the red man in lifting himself out of his condition of tutelage and dependence, and that it is clearly our wisdom and our duty, through education and every other means, to prepare him for a higher civilization by encouraging him to assume the duties and responsibilities of full citizenship."

It is to be hoped that these enlightened views will be practically carried out in the case of all the tribes throughout the Dominion; and that the Indian, freed from tutelage and raised from dependence, may be induced to enter into such of the callings of civilized life as may be most congenial to him, and may thus become an element of strength and progress in the body politic. He undoubtedly possesses qualities which fit him not unequally to bear his part with the other races which enter into the composition of our people, in building up the future greatness of the Dominion.



SOME OBSERVATIONS ON THE MENOBRANCHUS  
MACULATUS.

By HENRY MONTGOMERY, M.A.

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The *Menobranchnus maculatus* is an aquatic animal belonging to the vertebrated class known as Amphibia, is of the order *Urodela*, and the family *Proteide*. It occurs in Lakes Champlain, George, and Seneca; also in Onion River and other waters of the northern and eastern United States, as well as in various Canadian lakes and rivers. All the specimens before me are from the Don River, Humber River, and Toronto Bay. It is said occasionally to reach the length of two feet; but the majority of adults seem to be little more than half that length.

This tailed amphibian is provided with two pairs of locomotive appendages, each of which is nearly two inches long, and has four toes, destitute of claws. The head is very much depressed or flattened from above downwards, is somewhat semicircular in outline, and is furnished with a wide mouth, fleshy lips, two minute nostrils opening close to the oral cavity, and a pair of small but well developed eyes; eyelids are absent. The teeth, which consist of one row in the lower and two rows in the upper jaw, are numerous, of medium size, conical, and separated by short intervals. In each side of the lower lip is a deep, horizontal groove or furrow, commencing about one-sixth of an inch from the median line, and passing outwards and backwards to the limit of the gape, and into which groove passes the attenuated margin of the upper overlapping lip. The constriction forming the neck, between the head and trunk, is not very strongly marked, but a tolerably large, horizontal fold of skin, extends backwards under the throat. On the sides of the neck are situated the branchiæ or breathing-organs; they are functional throughout life, and are composed on each side of three bunches of reddish bushy lamellæ, or rather three clusters of filamentous processes springing from three main stems, and in these filaments the blood is submitted to the action of the oxygen gas dissolved in the water supplied them. There are two slits,

forming the branchial apertures, placed obliquely on each side of the neck, the anterior aperture being almost double as large as the posterior, the former permitting the current of water to flow out between the first and second gills, and the latter between the second and third gills. During sleep, the gills, so active and red in the waking condition, become sluggish in movement and pale in colour; indeed so marked is the difference in the action and colour of these external respiratory organs when awake and asleep, that one would, at first sight of a sleeping *Menobanchus*, suppose it to be dead.

The trunk is cylindrical and thick, being usually five or six inches in circumference. The tail does not become absorbed and disappear in the full-grown animal as it does in frogs and toads, but remains during its whole life; it is compressed or flattened from side to side, forming a strong, vertical, ancipital swimming organ, similar to the tail of a fish, from which, however, it differs in being destitute of spines, and in tapering considerably so as to become lanceolate.

Neither dermal nor epidermic plates, scales, or warty excrescences are ever developed in this creature; on the contrary, the surface of the body is quite smooth, soft, and more or less moist and slippery, owing to a thick greyish gelatinous secretion of the skin, which probably assists its movements over stones, &c., on the bed of the stream. On removing this coating of light-grey slimy matter, the upper surface and sides of the whole animal are seen to be of a dark brownish-grey colour, beautifully speckled or mottled with distinct large dark purple spots for the most part circular in shape. The inferior surface of the body is much lighter in colour than the superior surface, being of a greyish-white tinged with yellow, and also sometimes dotted with little purplish spots.

On dissection of a *Menobanchus*, the flesh is found to be very white and inviting to the palate. Notwithstanding the intense disgust with which most fishermen and many other persons look upon it, there is no reason for supposing its flesh less savoury than that of its near relative, the *Axolotl*, which forms such a delicacy on the table of the Mexican.

As regards its internal anatomy, it may be observed that the alimentary tract consists principally of a mouth, gullet, stomach, and intestine terminating in a cloaca through which pass the generative products, urinary and fecal matters. The mouth is

furnished with three series of similar teeth, as before stated. A large tongue is present, and is free at its anterior extremity. The gullet is thick and muscular, the stomach elongated, and the intestine comparatively short, as in all carnivorous animals. It has been said that its food consists of crustaceans, molluses, and fishes; but from my observations of the *Menobranchus* in an aquarium plentifully stocked with Molluses, such as the Physadæ, Linnæans, Paludinæ, Planorbis, Anodonts, &c., as well as Crustaceans, I am not warranted in asserting that it feeds on anything other than true fishes. The liver is disproportionately large; a well-developed gall-bladder is present, as are also a pancreas and spleen. The kidneys form two greatly elongated organs, each like a cylinder rounded at both ends, and having a well-defined longitudinal depression—the hilum—throughout the whole length of one side.

The heart occupies but a limited portion of the thoracic cavity, consisting of two small auricles and a slightly larger ventricle, which latter possesses, as it were, several minute secondary cavities, thus presenting the appearance more of a sponge-skeleton than of one single chamber. The blood-corpuscles are oval nucleated, and of very great size, their long diameter being about 62 micro-millimetres. In connection with this it may be mentioned that the blood-corpuscles of man measure 7.5 micro-millimetres, or less than  $\frac{1}{3000}$  of an inch in diameter; in the frog they are 22 mmm. in length; and in amphiuma they are largest of all, attaining the extraordinary length of 77 micro-millimetres.

True air-breathing lungs are present in the form of a pair of much-elongated narrow sacs stretching back from the cavity of the mouth, one on each side, and having the heart and œsophagus lying between them. Each pulmonary sac is from two to three inches long, and has a diameter nearly as great as that of an ordinary goose-quill. The nostrils are in communication with the pharynx. The nervous supply is by no means feeble, as is evidenced by the great sensitiveness of the animal.

An examination of the skeleton shows the inferior maxilla to be formed of only two pieces or rami, which are directly articulated with the skull, and the latter in its turn is jointed to the first vertebra of the spine by two distinct and separate surfaces. The vertebræ number thirty-three, are amphicoelous, and have short, slender ribs attached to their transverse processes in the dorsal and lumbar regions. The pectoral arch is in connection

with the third, and the pelvic arch with the nineteenth vertebra. The fore-legs are always longer than the hind-legs, but the latter have the advantage in thickness. The radius and ulna of the fore-arm, likewise the tibia and fibula of the shank, remain as separate bones; the carpus and tarsus both consist of small cartilages that never ossify; and all the feet are tetradactyle. Here may be observed striking differences from the condition which obtains in the frog, where coalescence takes place both between the bones of the forearm and between the bones of the shank, so that there comes to be but a single bone in each; the carpus and tarsus are ossified, two of the tarsal bones are greatly lengthened to assist in leaping, and each of the hind feet is five-toed.

Some measurements of a specimen in my possession, recently captured in the Don, may be mentioned here. These measurements may fairly be regarded as those of an average *Menobran- chus* :

Entire length	-	$13\frac{2}{3}$	inches.
Head	-	2	inches long.
"	-	$1\frac{1}{2}$	" broad.
"	-	$4\frac{2}{3}$	" in circumference.
Neck	-	$\frac{7}{8}$	inch long.
Trunk	-	$6\frac{1}{2}$	inches long.
"	-	$5\frac{3}{4}$	" in circumference.
Tail	-	$4\frac{1}{4}$	" long.
Fore-leg	-	$1\frac{3}{4}$	" long.
"	-	$1\frac{1}{3}$	" in circumference.
Hind-leg	-	$1\frac{1}{2}$	" long.
"	-	$1\frac{1}{4}$	" in circumference.
Gill	-	$\frac{3}{4}$	" long.
Anterior Gill-slit	-	7	lines in length.
Posterior "	-	4	"

Another specimen lately taken from the same stream, and dissected by me, was of less size, being twelve inches long, but possessed similar proportions throughout.

The generic name *Menobran- chus* is derived from two Greek words signifying that the external branchiæ are permanent, and do not disappear during the life of the animal, as in the case of the salamander, newt and frog. The specific name *maculatus* (Latin for spotted) refers to the deep purple spots with which the skin is studded.

The name *Necturus lateralis* is also given to it by some naturalists. In many localities it is known to those unacquainted with scientific classification and nomenclature as the "big water lizard," the "mud-puppy," "water dog," or "dog-fish." Of course the study of its anatomy proves it to be lower in organization than either the reptiles or mammals, and higher than the fishes. The principal characters distinguishing it from the fishes are: 1st. the possession of jointed limbs instead of fins; and 2nd, the absence of a median spiny fin. The less important distinguishing characters are: 1st, the nasal sacs, which are closed posteriorly in fishes (except Myxinidæ and Lepidosiren) here open into the pharynx; 2nd, the heart has two auricles, but in fishes (except Dipnoi) there is only one auricle in the heart; 3rd, the presence of lungs, which organs are wanting in fishes (except Dipnoi, where the swim-bladder performs the functions of lungs.)

On the other hand it is separated from lizards and other true reptiles by: 1st, the articulation of the skull with the vertebral column by *two* condyles or articulating prominences on the occipital bone, the reptiles having but *one* such condyle; 2nd, the absence of a quadrate bone between the jaw and skull; 3rd, the formation of each ramus of the lower jaw of only one piece; whereas in reptiles it consists of several pieces; 4th, the presence of gills, which never appear in reptiles at any period of their existence; and 5th, the complete absence of an external covering of scales or scutes.

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## NATURAL HISTORY SOCIETY.

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### ANNUAL MEETING.

The Annual Meeting of the Natural History Society took place on the 19th May 1879.

The chair was occupied by the President, Principal Dawson. The minutes of the last annual meeting and those of the previous meeting of Council were read and approved.

The President then delivered the following address:

## ADDRESS BY PRINCIPAL DAWSON, LL.D., F.R.S.

The scientific business of the Society in the past winter has included the reading at our monthly meetings of ten papers, comprising a considerable range of subjects. In Geology we have had papers by Dr. Harrington and myself on the mineralogy and mode of occurrence of Apatite; by Dr. Hunt on the various new points which engaged his attention in Europe in the summer of 1878; by Mr. Selwyn and Mr. Macfarlane on the disputed Stratigraphy of Eastern Canada; by Mr. Donald on the remains of a Fossil Elephant; by myself on the Extinct Floras of America. In other departments were Notes on Canadian Ferns by Mr. Goode, on an Esquimaux Bow and Arrow by Mr. Taylor; on the results of an Excursion to St. Jerome by Mr. Marler and Mr. Caulfield; on the Water supply of Montreal by Dr. Baker Edwards.

Of all these subjects that which has perhaps excited the greatest amount of attention, and which best deserves notice here, is the much disputed Geology of the Quebec Group and the associated rocks in the Province of Quebec. This is a subject which has long been in controversy, and which is mixed up with some of the most difficult questions in general geology and in the local structure of the eastern slope of the American continent, both in Canada and the United States. It is a subject on which I have up to the present time avoided any public expression of opinion:—not that I have been indifferent to it—no geologist could be so—nor that I have had no opinions of my own. Having travelled over and examined large portions of the territory occupied by these rocks, it was impossible to avoid arriving at some interpretation of them. But the subject was too intricate to be lightly treated, and others were working at it in detail, and with advantages of public aid which I did not possess. Now, however, it comes up before this Society, introduced in the elaborate and able paper of Mr. Selwyn, followed by the criticisms of Mr. Macfarlane; and these supplemented by Dr. Sterry Hunt's exposition of his own well-known views, in the discussion of Mr. Macfarlane's paper. Farther, in connection with all these various and somewhat discordant opinions, the conclusions arrived at by our late lamented colleague, Sir W. E. Logan, have been canvassed and to some extent set aside.

In these circumstances duty requires that some extended

notice of this subject should be taken in this address; and that if no absolutely certain conclusions on all the points in dispute can be affirmed, the state of the controversy should be clearly explained to the bystanders, and the ground cleared for further wrestling on the part of the combatants, should this prove to be necessary. In attempting to perform this somewhat difficult task, it will be proper that I should refrain from entering into details, and that I should confine myself to the question as it relates to Canada, without discussing those features of it which belong to the regions farther south.

I would first say a few words as to the position of the late Sir William B. Logan in relation to the older rocks of Eastern Canada. When Sir William commenced the Geological Survey of Canada in 1842, these rocks, in so far as his field was concerned, were almost a terra incognita, and very scanty means existed for unravelling their complexities. The "Silurian System" of Murchison had been completed in 1838, and in the same year Sedgwick had published his classification of the Cambrian rocks. The earlier final reports of the New York Survey were being issued about the time when Logan commenced his work. The great works of Hall on the Palæontology of New York had not appeared, and scarcely anything was known as to the comparative palæontology and geology of Europe and America. Those who can look back on the crude and chaotic condition of our knowledge at that time, can alone appreciate the magnitude and difficulty of the task that lay before Sir William Logan. To make the matter worse, the most discordant views as to the relative ages of some of the formations in New York and New England which are continuous with those of Eastern Canada, had been maintained by the officers of the New York Survey.

Sir William made early acquaintance with some of these difficult formations. His first summer was spent on the coast of Gaspé and the Baie des Chaleurs, where he saw four great formations, the Quebec group, the Upper Silurian, the Devonian, and the Lower Carboniferous, succeeding each other, obviously in ascending order, and each characterized by some fossils, most of which, however, were at that time of very uncertain age. I remember his showing me in the autumn of that year the note-books in which he had carefully sketched the stratigraphical arrangements he had observed, and also the forms of characteristic fossils. But both wanted an interpreter. The plants

of the Gaspé Devonian were undescribed; many of them of forms till then unheard of. The shells and corals and graptolites of the older formations could be only roughly correlated with some of those in the New York reports. The rock formations were very unlike those of the New York series. Still this work of 1842 and '43 was plain and easy compared with that which arose in the tracing of these formations to the south-west. I may add here that I have since studied some of these Gaspé sections with Sir William's manuscript note-books in my hand, and have been amazed by the extraordinary care and exactitude with which every feature of the rocks had been observed and noted down. Much of the detail in these early note-books of Sir William, still remains unpublished. Those who would detract from the work of Sir William Logan, if there are any such, should remember these early beginnings, and compare them with the massive foundations which have been laid for us to build upon.

And now, after the labour of more than thirty years on the part of Sir William and those he had gathered around him, how do these subjects stand? (1) We have all the comparatively flat and undisturbed formations of the great plains of Upper and Lower Canada, our share of the interior continental plateau of America, worked out and mapped, and their fossils characterized so that a child may read them. (2) The complex hilly districts with their contorted, disturbed and altered beds, which extend from New England to Gaspé, have been traversed in every direction,\* the limits of their different formations marked, and a theory as to their age and structure put forth, which, whether we accept it or not, has in it important features of the truth, and rests on facts on which every disputant must take his stand. (3) We have the still older formations of the Laurentide hills traced in their sinuous windings, and arranged in an order of succession which must stand whether the names given by Sir William, and now accepted throughout the world, be objected to or not. After the work of Sir William Logan, no cavilling as to names can ever deprive Canada of the glory of being the home of the scientific exploration of the Laurentian; and much examination of the

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\* The extent of measured and paced sections in these districts by Sir William and Mr. Richardson is almost incredible; and these have been made the basis not only of the geology but of the excellent topographical maps prepared by Mr. Barlow.



ground which he explored enables me to affirm that no one will ever be able permanently to upset the general leading subdivisions which he established in the Laurentian and Huronian systems.

Let us turn now to the particular points brought before us in the papers to which reference has been made. It may be well however first to notice some general geological facts which must be present to our minds if we would enter intelligently into these discussions. The formations with which we have to deal in the more ancient geological periods all belong to the bed of the sea. Now in the sea bottom there have been in process of deposition, side by side and contemporaneously, four different kinds of material, differing extremely in their mineral character and in the changes of which they are susceptible. The first of these consists of earthy and fragmental matter washed by water from the surface or sea margins of the land and deposited in belts along coast-lines, or on broader areas where ocean currents have been drifting the detritus ground from the land by ice or washed down by great rivers. The second consists of organic remains of shells, corals and foraminifera, accumulated in coral reefs and the debris washed from them, in shell beds and in the chalky ooze of the deep ocean. Some beds of this kind are very widely distributed. The third is composed of material ejected by igneous action from the interior of the earth and either spread in the manner of lava-flows or of beds of fragments and fine volcanic ash. Such rocks naturally occur in the vicinity of volcanic orifices, which are often disposed in long lines along coasts or crossing ocean basins, but fragmental volcanic matter is often very widely spread by ocean currents and is interstratified with other kinds of aqueous deposit. The fourth and last description of bedded matter is that which is deposited in a crystalline form from solution in water. In later geological times at least, such deposits take place in exceptional circumstances, not of frequent occurrence. Such beds are dolomite, greensand, gypsum, and rock salt.

Now it may be affirmed that at each and every period of the earth's geological history, all or most of these kinds of deposit were in progress locally. But it may also be affirmed that in certain geological periods there was a predominance of one or more over very great areas: and that in any particular area, even of considerable size, there may be definite alternations of these different kinds of material characteristic of particular periods.

Again, along certain lines of the earth's crust, the beds deposited by water have been folded and crushed together, probably by the contraction of the earth's shell in cooling, and along these lines they have been changed, in the way of hardening and becoming crystalline or in being chemically recompounded—alterations which are usually known as metamorphic. But still further, some kinds of deposit are much more liable to such metamorphic changes than others. More especially the beds of igneous origin, from their containing abundance of basic matter, as well as of silica, very readily change under the influence either of heat or water, becoming it may be highly crystalline, or having new mineral substances formed in them by new combinations, or on the other hand, when acted on by water, combining with it and forming hydrous silicates.

One other curious coincidence it is necessary to mention.—It is where the greatest deposits of sediments are going on along coasts or in the course of currents, that crumpling and bending of the crust are most likely to occur, and igneous ejections to be thrown out; and conversely, where igneous ejections are piled up, coasts may be forming or currents deflected, so as to cause at these points the greatest deposit of sediment.

These considerations are sufficient to shew the true value of mineral character, first as a means of distinguishing rocks of different nature and origin, and secondly of separating rocks of different ages within limited localities; with its entire worthlessness when applied to distinguish the ages of beds in widely separated localities. There are in America rocks as widely apart in time as the Huronian of the East and the Carboniferous of the West, which are scarcely distinguishable in mineral character; there are rocks of identical age, as for instance the Lower Silurian of New York and Western Canada and that of Nova Scotia and of Cumberland, which are as unlike in mineral character as it is possible for rocks of the most diverse ages to be.

But can we trust implicitly to stratigraphy? Certainly, when we find one rock directly superimposed on another we know that it is the newer of the two. But when we find old rocks slid over new ones by reversed faults, when we find sharp folds overturning great masses of beds, and when we find portions of beds hardened, altered, and become more resisting, standing up as hills in the midst of the softer materials, perhaps of the same age, which have been swept away from around them, then we have the real difficulties of stratigraphy.

We may have difficulties in fossils as well. Nothing is more common than to find in the modern ocean areas traversed by cold currents which have very different animals living in them from those in the same latitude where the water is warmer. The same thing occurs in older formations. The abundant corals and large shell-fishes in our Montreal limestone of the Trenton age, show a condition of things in which the great area of Central North America was covered with warm waters from the south, teeming with life, and was sheltered from the northern currents of cold and muddy water. But in the Utica shale which succeeds, we have the effect of these cold currents flowing over the same area, loading it with mud, over which lived Graptolites and old-fashioned northern Trilobites like *Triarthrus Beckii*, instead of the rich life of the Trenton. This is a mere change to a cold or glacial age.

Now when I inform you that all these causes of error embarrass the study of the Quebec group of Sir William Logan, you will be able to appreciate the difficulties of the case. Crossing the narrow line, a mere crack of the earth's crust, the great reversed fault of Eastern Canada and Lake Champlain, we pass at once from the flat uniform deposits of the great continental plateau of America to entirely different beds, formed at the same time along its Atlantic margin. These beds were affected by volcanic ejections mixing them with ash rocks and causing huge earthquake waves, which tore up the rocks of the seabottoms and coasts, and formed great irregular beds of conglomerate, sometimes with boulders many feet in length. In the intervals of these eruptions the area was overflowed by cold Arctic currents carrying sand and mud, sometimes altogether barren of fossils, or again loaded with cold-water creatures like the Graptolites, which occur in vast quantities in some of the beds. Alternating with all this were a few rare lucid intervals, when fossiliferous limestones, just sufficiently like those of the great interior plateau to enable us to guess their similar age, were being produced here and there. Farther, this heap of most irregular and peculiar deposits was that along which subsequent flexures and igneous eruptions and alterations of beds both by heat and heated waters were most rife, all the way down to the Devonian period.

At first the real conditions of this problem were hidden from Sir William Logan, by the error of supposing, with most of the

geologists of the United States, that the great reversed fault was a true stratigraphical superposition, and consequently that these strange deposits were newer than those to the west of them. But so soon as the actual nature of the case was made manifest, and this was first due to a right apprehension of the fossils, for which Mr. Billings deserves much of the credit, Sir William at once and for ever apprehended the real conditions of the problem, and set himself to work it out on the true line of investigation.

In evidence of this, and as presenting as clear a view of the whole matter as any we can give, up to the present time, I quote from a note by Sir William appended to Mr. Murray's report on Newfoundland for 1865, and which is less known than his utterances on this subject published in the Canadian reports:

“The sediments which in the first part of the Silurian period were deposited in the ocean surrounding the Laurentian and Huronian nucleus of the present American continent, appear to have differed considerably in different areas. Oscillations in this ancient land permitted to be spread over its surface, when at times submerged, that series of apparently conformable deposits which constitute the New York system, ranging from the Potsdam to the Hudson River formation. But between the Potsdam and Chazy periods, a sudden continental elevation, and subsequent gradual subsidence, allowed the accumulation of a great series of intermediate deposits, which are displayed in the Green Mountains, on one side of the ancient nucleus, and in the metalliferous rocks of Lake Superior, on the other, but which are necessarily absent in the intermediate region of New York and central Canada.

“At an early date in the Silurian period, a great dislocation commenced along the south-eastern line of the ancient gneissic continent, which gave rise to the division that now forms the western and eastern basins. The western basin includes those strata which extended over the surface of the submerged continent, together with the Pre-chazy rocks of Lake Superior, while the Lower Silurian rocks of the eastern basin present only the Pre-chazy formations, unconformably overlaid, in parts, by Upper Silurian and Devonian rocks. The group between the Potsdam and Chazy, in the eastern basin, has been separated into three divisions, but these subdivisions have not yet been defined in the western basin. In the western basin the measures are comparatively flat and undisturbed; while in the eastern they are thrown

into innumerable undulations, a vast majority of which present anticlinal forms overturned on the north-western side. The general sinuous north-east and south-west axis of these undulations is parallel with the great dislocation of the St. Lawrence, and the undulations themselves are a part of those belonging to the Appalachian chain of mountains. It is in the western basin that we must look for the more regular succession of the Silurian rocks, from the time of the Chazy, and in the eastern, including Newfoundland, for that of those anterior to it.\*

In studying these rocks, as Sir William well knew that the great line of disturbance and igneous action lay to the east, as he further knew that in this belt of country rocks all the way up even to the Carboniferous had been profoundly altered, he was not surprised to find that in tracing the Quebec rocks to the south and east, the clay slates, still holding the same fossils, became micaceous or nacreous slates, the bituminous shales graphitic slates, the limestones crystalline marble; and that even serpentine, chloritic slate and hard felspathic rocks appeared to take the place of ordinary aqueous sediments. Consequently he arrived at the large generalizations on the subject embodied in his map of Canada, and to which I believe he adhered to the last.

Was he right in these generalizations? In part, at least, it is certain that he was. I have myself, following in his track, seen distinct Lower Silurian fossils in the nacreous slates and graphitic slates of the Townships, and I have seen these slates alternating with hard quartzites, and felspathic and brecciated rocks, and so far as could be made out by stratigraphy, with chloritic rocks, crystalline dolomite, soapstones and serpentine, these rocks seemingly representing the shales of Point Levis if not still newer members of the series. Dana has recently shown that rocks in Connecticut, usually referred to the Quebec group, or even to the Lower Taconic series of Emmons, and often in a highly crystalline state, actually contain fossils newer than those of the Quebec group, or of Hudson River age.\* Murray in Newfoundland has found the most unequivocal superposition of serpentine and chloritic slate on fossiliferous rocks of the Quebec group, and intervening in age between them and the Hudson

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\* American Journal of Science, May, 1879. One of the fossils recognized by Dana seems to be the *Stromatopora compacta* of Billings really a *Stenopora*, known in Canada both below and above the Levis,

River group, a point to which we must refer subsequently; and there is nothing incredible or even very unlikely in this. On the other hand, knowing the complexities of all the parts of this troubled sea of eastern palæozoic rocks which I have studied, I cannot deny that there may exist crests of beds older than the Quebec group projecting locally and perhaps largely through these rocks. I am the more inclined to believe this, since there is the best reason to hold that the unaltered members of the Quebec group, as mapped by the Survey on the south shore of the St. Lawrence, include beds ranging all the way from the Lower Cambrian up to the Chazy. Similar, perhaps older, beds, no doubt exist largely, mixed with igneous outflows and breccias, in the hills of the interior.

But if any man thinks proper to put down a hard and fast line on the map of Eastern Canada, and to maintain that all the crystalline rocks which apparently project through and rise above the Quebec group, are of greater age, I must decline to go with him in this assertion, since I feel certain that such an extreme view cannot be in accordance with facts. No one, however, I feel persuaded, will now go so far as this; but I believe the pendulum has already swung farther than it should in this direction, and must go back again nearer to Sir William Logan's position. Facts in support of this conclusion rise before my mind as I write, and may be brought forward on some future occasion, but they would involve a series of papers for their full elucidation.

We have had presented to us ably and well by Mr. Selwyn, Mr. Macfarlane, and Dr. Hunt, conclusions differing more or less widely from those of Sir William, and from each other. There are no doubt important elements of truth in them all, but when these are fully and fairly sifted, the unprejudiced geologist will conclude that while they may modify the results of Sir William's work, they by no means overthrow them; and that we are still a long way from the solution in all their details of the problems which occupied Sir William to the last, and which he left only partially solved.

We may now sum this matter up, in so far as Sir William Logan's work is concerned, and that of Richardson as his assistant, and of Hall and Billings in the department of Palæontology. Their researches have established:—(1) The general diversity of mineral character in the Palæozoic sediments on the Atlantic slope as compared with the internal plateau of Canada. In those

results Bailey, Matthew, and Hartt in New Brunswick, and the writer in Nova Scotia, have also borne some part. (2) The establishment of the Quebec group of rocks as a series equivalent in age to the Calciferous of America, and to the Arenig and Skiddaw of England, and the elucidation of its peculiar fauna. (3) The tracing out and definition of the peculiar faulted junction of the coastal series with that of the interior plateau, extending from Quebec to Lake Champlain. (4) The definition in connection with the rocks of the Quebec group, by fossils and stratigraphy, of formations extending in age from the Potsdam sandstone to the Upper Silurian, as in contact with this group, in various relations, along its range from the American frontier to Gaspé, but the complexities in connection with these various points of contact and the doubts attending the ages of the several formations have never yet been fully solved in their details. (5) The identification of the members of the Quebec group and associated formations with their geological equivalents in districts where these had assumed different mineral conditions, either from the association of contemporaneous igneous beds and masses, or from subsequent alteration or both. It is with reference to the results under this head, the most difficult of all, that the greater part of the objections to Sir William's views have arisen.

Let us now shortly examine Mr. Selwyn's new results, with reference to these conclusions, especially to the last.

The first point deserving of notice here is the inability of Mr. Selwyn to recognize in the extension of the Quebec group eastward and westward of Quebec, those subdivisions which have been named the Levis, Lauzon, and Sillery. Originally Sir William recognized two divisions only, the Levis and Sillery. Subsequently he introduced, on the ground merely of convenience, the intermediate Lauzon; though apparently not regarding the three-fold division as at all important, but merely as provisional\*.

Of those subdivisions the most important is the Levis, which forms the fossiliferous and most readily recognized horizon of the Quebec group. About the precise base of this division, held to be the lowest of the group, there is some uncertainty; Sir William has referred to it as resting on Potsdam rocks in the vicinity of Lake Champlain, and farther east on older shales and limestones; and Mr. Richardson has endeavoured to separate

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\* Report of 1866, p. 4.

from it certain sandstones and associated beds on the Lower St. Lawrence. More especially I may refer to the sandstones and shales near Metis, holding *Astropolithon*, *Scolithus*, and *Arenicolites spiralis*, and to beds near Matane holding species of *Conocéphalites* of very primitive type. In Newfoundland also, where the sequence of these beds is better seen than elsewhere, there are, according to Richardson and Billings, 2000 feet of beds under the typical Levis and over the Lower Calciferous, holding fossils unquestionably of the second fauna of Barrande, or Lower Silurian, and below them there is a great thickness of Calciferous and Potsdam. All these beds must exist in the Quebec group districts of Canada, folded up along with the Levis, and as yet very imperfectly separated from it, nor is it at all unlikely that in some localities they may have been confounded with the Lauzon and Sillery.

With regard to the distinction of these last-named formations as upper members of the Quebec group, we must agree with Mr. Selwyn that in the present state of our knowledge they cannot be clearly separated from the Levis or from one another. Nevertheless it is true that on the typical Levis there rest sandstones and shales of considerable thickness, not holding its characteristic fossils, and forming an upper member of the Quebec group, as yet not well defined, but representing in nature the Lauzon and Sillery of Logan.

In the next place, Mr. Selwyn is disposed to separate from the Quebec group the greater part of those altered and crystalline rocks associated with it, and which appeared to Sir William Logan to be metamorphosed equivalents of this group, and largely of its upper or Sillery division. Of these rocks he forms two series, which however he regards as closely associated, and probably not unconformable with each other.

The first and nearest in age to the Quebec group is defined as including "felspathic, chloritic, epidotic and quartzose sandstones, red, gray and greenish siliceous slates and argillites," with "breccias and agglomerates, diorites, dolerites, and amygdaloids," as well as serpentinite, dolomite, and calcite. In short this formation is one of mixed igneous and aqueous origin, non-fossiliferous, except in the case of a few microscopic fragments, and mostly crystalline. As regarded by Sir W. E. Logan, these rocks, in consequence of their apparent conformity with the Levis series, and their apparent superposition in some sections, were held to



be an upper member of the Quebec group, and were mapped as Sillery. They were thus placed in the same position with the serpentine and chloritic formation of Newfoundland, as described by Murray, with the Cobequid series as I have described it in Nova Scotia,\* and with the Borrowdale igneous rocks resting on the English equivalents of the Levis beds as defined by Ward in Cumberland.

Mr. Selwyn, on the other hand, thinks that the main mass of these peculiar rocks either comes out unconformably from beneath the Levis series or is separated from it by a fault, and is in all probability older, though the obscure traces of fossils found in some of the beds would indicate that they are not older in any case than Lower Silurian or Upper Cambrian.

It is obvious that with reference to a formation so greatly disturbed, either of these theoretical views may be correct, or that there may be two crystalline series, one below and another above the Levis beds. Where I have had opportunity to observe the formation, at Melbourne, and in a few other places, I have seen no reason to dissent from Sir W. E. Logan's view; but at that time Mr. Selwyn's explanation was not before my mind, nor have I examined the sections on which he chiefly relies.

Had Sir W. E. Logan lived, it was his intention to have, at his own cost, bored through the crystalline rocks at some selected site, in order to obtain positive proof of the subterposition of the Levis beds. This expense is not now likely to be incurred, but the whole question will in course of time be settled by the careful *re-examination and mapping*, which now that these new views have been suggested by the head of the Geological Survey, the district is likely to receive.

Mr. Selwyn's third division, supposed to be still older, possibly Lower Cambrian, in some respects resembles the second, but is predominantly slaty and quartzose, though still with dolomites and other magnesian rocks. These would naturally fall into the place assigned to them, if the age attributed to the second series be admitted, otherwise they come into the period of the Sillery, or some newer formation, in an altered condition. I do not know that fossils have been found in these rocks, within the limits of Canada at least, but if they are really of Cambrian age, the richness of this fauna elsewhere in N. E. America would warrant

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\* *Acadian Geology*, third edition.

the hope that the age assigned to them may be indicated by fossils, while, if like some similar beds to the southward, they hold Silurian species, these also must in some places be recognizable; so that if they finally fail to afford fossil remains or yield Lower Cambrian species, this, with their mineral character and apparent distribution, would sustain Mr. Selwyn's view; while, on the other hand, the discovery of a few distinctive Silurian forms might suffice to overturn it.

It would appear that the third and second series of Mr. Selwyn, above mentioned, are the same with the rocks which in Hitchcock's map of New Hampshire are named Montalban and Huronian. The former term has however been applied by Dr. Hunt to a series newer than the Huronian, and possibly of Lower Cambrian age, so that if it is correctly used by Hitchcock, his so-called Huronian may be in reality Upper Cambrian or Lower Silurian. It is to be deprecated as not conducive to correct conclusions, that terms of this kind should be used to represent merely mineral resemblances, irrespective of those evidences of geological age derived from stratigraphy and fossils. It is due here to Dr. Hunt to explain that he has for many years on independent grounds regarded the beds of Mr. Selwyn's second and third groups as, for the most part at least, Huronian in age, and a similar conclusion was also arrived at from comparison with the older formations of Scandinavia, by Mr. Macfarlane. Thus in one way or another all these gentlemen dissent from Sir William's conclusions, while also differing from each other, a sufficient evidence of the complicated character of the problem with which he had to deal, and whose ultimate solution may embrace elements of all the generalizations which have been put forth.

Some suggestions may at least be offered toward the solution of these questions which deserve the attention of those who have been occupied with them. The first is that we should accustom ourselves to the anticipation that contemporaneous palæozoic rocks in the regions of the western lakes, of the plains of Ontario and Quebec, and of the eastern slope, are not likely to be identical in mineral character. Farther, that even in the central of these three regions we may expect differences in approaching certain parts of the older rocks. At Murray Bay, for example, on the border of the Laurentian, we find the Black River limestones in great part represented by coarse sandstones, and we

find similar changes in the Chazy near Grenville. A third suggestion is, that in order to understand the eastern members of the Lower Silurian, it is necessary to be acquainted with the contemporaneous igneous ejections mixed with these rocks, and if possible to distinguish them from those of similar character so largely present in the Huronian. This I have attempted, though with only partial success, to effect for the Acadian Provinces. Another, to which Dr. Hunt has directed attention in his recent report in connection with the Survey of Pennsylvania, is the importance of inquiry as to which of the many successive movements and plications of the earth's crust occurring in palæozoic time, have most seriously affected the now so greatly plicated and disturbed rocks of the Quebec group. Still another, and one of the most important, is the study of the various kinds of alteration which these rocks have undergone. We have in eastern Canada rocks as young as the Devonian which have been sensibly affected in this way, and there can be no doubt that large areas of the Quebec group have suffered similar changes, and that on the one hand it is possible that these metamorphosed portions have been confounded with older series, or that on the other these older series have been inadvertently mixed with them.

The value to be attached to fossils is another point of much importance. Long experience has convinced me that in the Cambrian and Silurian ages this kind of evidence is the most conclusive of all; but then it must be rightly understood. As already observed, we must discriminate the animals characteristic of the cold Atlantic waters loaded with Arctic sediment, from those of the sheltered continental plateau. We must also bear in mind that oceanic and probably floating forms of low grade, like the Graptolites, have an enormous range in time, as compared, for example, with the Trilobites, and the same remark applies to some mollusks proper to sandy or muddy bottoms, like the Lingulæ and their allies, as compared with other mollusca.

All these precautions must be taken in the study of these rocks, and it involves no depreciation of the geologists above-mentioned, to say that the different conclusions at which they have arrived, depend very much on the different degrees of importance which they have attached to the various kinds of evidence accessible.

One word, before closing, respecting names. These are of little importance in themselves, but it is of consequence that they

should not be needlessly changed, and that they should not be misapplied.

The name "Quebec Group," introduced by Sir William Logan, should be retained for that peculiar development of the rocks of the second fauna, eminently exposed and accessible in the vicinity of Quebec, to whatever extent its extensions east and west may be circumscribed; and whatever value may be attached to the local subdivisions into Levis, Lauzon and Sillery. On the one hand, the use of one of these terms, Levis, for the whole, leads to misconception; and the absurdity of the term "Canadian" (applied in one widely-known text book to the rocks of this age) becomes apparent when we see it made correlative with a purely local name like "Trenton," and when we consider that Canada is a region greater than the United States of America, and with equally varied geological structure.

The more recent developments in the geology of North America require, as Dr. Hunt and Mr. Selwyn have urged, that the Cambrian system should be recognized as a group altogether distinct from the Silurian; and whatever views as to the use of these names may ultimately prevail in England, for us the dividing line between the Cambrian and the Siluro-Cambrian or Lower Silurian, unquestionably comes about the horizon of the Potsdam. As to the formations older than the Cambrian, I am disposed to regard the Moutalban and Taconian of Dr. Hunt as representing definite groups of rocks, which may however eventually prove to belong to the base of the Cambrian, with which equivalent strata in the Maritime Provinces of Canada seem to be associated. The Huronian series of Logan represents another great fact in the geology of North America, namely a period of immense igneous ejection and disturbance intervening between the Laurentian and the Cambrian. In the typical Huronian area of Lake Huron it unquestionably rests unconformably on the Laurentian, and is itself overlaid by rocks of Cambrian or still greater age. It has precisely the same mineral characters and position as far east as New Brunswick and Newfoundland, and as far west as the Pacific slope,\* and is thus one of the most

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\* Clarence King's Report of the 40th Parallel. The rugged features and precipitous sides of the Laurentian and Huronian exposures in this region correspond with Logan's view of the steep slope of the Laurentian land at the time of the deposition of the Quebec Group rocks.

widely diffused of American formations, though I believe it has locally been confounded with rocks of similar mineral character but of newer date. The upper Laurentian of Logan, the Norian of Hunt, is entirely different in mineral character from the Huronian, and stratigraphically is related to the Middle Laurentian rather than to the Huronian, notwithstanding local unconformity. The Lower Laurentian of Logan may now, since the explorations of Vennor,\* be safely divided into a lower and middle group, the former being however nothing more than the great gneissic formation recognized by Logan as the Trembling Mountain gneiss, which forms the base of his well-known Laurentian section, and the Bojian gneiss of European observers. The idea that the Middle Laurentian, the horizon of Eozoon Canadense and of the great Phosphate and Graphite deposits, is identical with the Hastings group, or with the Huronian, has, I am fully convinced, after some study of the Lake Huron, Madoc and St. John exposures of these formations, no foundation in fact. There seems, however, good reason to believe that the gap between the Lower Laurentian of Lake Huron and the Huronian, is to be filled not merely by the Middle Laurentian and the Norian, but by such rocks as those described by Dr. Bigsby, Prof. Bell and Dr. G. M. Dawson on the Lake of the Woods and other regions west and north of Lake Superior, and at present included in the Huronian, to the base of which many of them no doubt belong.†

I should not have occupied your time so long with these matters, but for their great importance geologically, and the able papers in which they have been brought under our notice, and for the circumstance that I have been renewing my studies of these rocks, in the hope of contributing some notes on Sir William Logan's share in their investigation, to a biographical sketch of that eminent geologist now in progress under the care of our associate, Dr. Harrington, to whom it has been committed by Sir William's executors.

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Mr. G. L. Marler, Chairman of the Council, then read the following report:—

Your Council have to report on the proceedings of the past year, which has just closed. In doing so they have to remark

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\* Reports Geological Survey of Canada.

† G. M. Dawson's Report on 49th Parallel. Bell, Reports Geological Survey of Canada.

that, owing to several causes, your finances are not in such a prosperous state as formerly. The yearly receipts from members' fees have much fallen off, and the Government having delayed the payment of the annual grant, retrenchment has been forced on your Society, and they have been obliged to do away with the services of Mr. Caulfield, and reduce the allowance to Mr. Passmore to the amount given him when first engaged.

The Council have also to report that several urgent repairs have been made to the building, and that much yet remains to be done to put it in a thorough state of repair; and recommend to the incoming Council to have the roof put in order. These improvements have enabled your Council to provide accommodation for several kindred Societies. The aquarium room has been done away with, and its space filled with shelves and cases—and this has made room for placing specimens which were lying in boxes on your premises.

Your Council would recommend the desirability of getting a members' register, which is much needed, and to see that all members receive regularly the *Naturalist* from the publisher, as several complaints on this matter have been made during the past year; and also that revision of the exchange list be carefully made.

The usual and regular Sommerville Lectures have been given to the number of six.

1. On the various forms of Musical Composition as determined by the great masters, their beauties, uses and abuses. By Fred. E. Lucy Barnes, Esq., R.A.M.
2. On our Great West as a home for the Emigrant. By Prof. Robert Bell, M.D.
3. On the Haida Indians of the Queen Charlotte Islands. By George M. Dawson, Esq., D. Sc., F.G.S.
4. On the Physiology of Digestion. By Dr. F. W. Campbell, L.R.C.P.
5. On Canada at the International Exhibition at Paris. By William Hamilton Merritt, Esq., A.R.S.M.
6. On the Physiology of Respiration.- By Dr. Vineberg.

A 7th was announced to be given by Dr. Hunt, but was not delivered owing to his illness.

These lectures have been attended by large numbers, and were of high merit and scientific character. The thanks of your Society are due to the gentlemen who so kindly and at so much trouble gave them.

Your Council have also to report that the usual annual field day took place on the first June, 1878. The party numbered over 118 members and friends. The day was a most favourable and enjoyable one. The party proceeded by rail to St. Jerome, where they were kindly received by the Rev. Father Labelle and a number of gentlemen of that village, to whom the cordial thanks of the Society are due for their kindness on that occasion, especially for the address of welcome by Father Labelle. Prizes were awarded for collections. No part of the country could be more suitable for a field day than St. Jerome and its environs, it being full of interest to your members. The receipts of the trip scarcely covered the expenditure, a small sum being required from the funds of the Society to cover the deficiency, \$3.05.

#### CURATOR'S REPORT.

Mr. Caulfield, the Curator, submitted the following report:—

The entire zoological collection has been closely examined and cleaned, and any specimens showing traces of museum pests have been thoroughly disinfected.

The cases containing the fishes, reptiles and exotic birds have been cleaned and re-papered, but owing to the coldness of the museum the work had to be suspended, leaving the papering of the cases containing the mammals and Canadian birds unfinished.

The alcoholic preparations in the cases upstairs have also been examined. Some of the common Canadian batrachians which had been bleached by long exposure to light have been removed, and the jars containing the remainder of the specimens have been cleaned and re-filled with fresh alcohol.

The miscellaneous collections in the old wall case in the aquarium room have been taken out, cleaned and temporarily arranged in the new wall cases. The collection of fossils presented by the late Sir G. Duncan Gibb has been cleaned and placed in the new table cases.

The entomological collection is in good order and free from dermestes, &c. The herbarium is also free from insects, but needs replenishing, as many of the specimens are old and faded.

The issuing of circulars to members for the monthly meetings has been attended to, and the cleaning of the building at regular intervals has been provided for.

The additions to the museum during the past session have been as follows:—

R. J. Fowler, Esq.—The large mouthed black bass, *centrarchus nigricans*.

—Loomis, Esq. of Sherbrooke.—Fossiliferous marble, Duds-well mine, District St. Francis.

Mr. Selwyn.—Canadian minerals.

*By purchase*:—

Pair of sea trout, *salmo Canadensis*, Smith.

Sculpin, or bull-head, *cottus*.

Sharp nosed sturgeon, *Accipenser oxyuncus*.

The Treasurer, Mr. Shelton, stated that the reserve funds of the Society had been largely drawn upon in consequence of the delay of the Quebec government in paying over the annual grant.

A piece of Canadian black marble, richly studded with curious fossils, was exhibited. It was a present from Mr. Loomis, High Constable of Sherbrooke, and had been extracted from the Duds-well mines, where it is to be found in large quantities; it is suitable for mantlepieces.

Mr. E. E. Shelton then read the Treasurer's report. (See p. 188.)

Principal Dawson stated that Mr. Thomas Currie, aided by himself, had been employed upon the collections in the museum since the departure of Mr. Caulfield.

It was moved by Mr. Muir, seconded by Mr. Joseph, "That the reports now read be approved and printed in the *Canadian Naturalist*." Carried.

The election of officers for the ensuing year was then proceeded with, and resulted as follows:—

*President*,—Mr. A. R. C. Selwyn, F.G.S.

*Vice-Presidents*,—Principal Dawson, Dr. De Sola, Prof. Harrington, Mr. Whiteaves, Mr. G. L. Marler, Dr. Sterry Hunt, Mr. H. Joseph, Mr. Robb, Prof. P. J. Darey.

*Corresponding Secretary*,—Dr. J. Baker Edwards.

*Recording Secretary*,—Mr. Frank W. Hicks.

*Treasurer*,—Mr. G. L. Marler.



*Council.*—Messrs. Muir, Brissette, Goode, Dr. G. M. Dawson, Dr. Bell, Mr. Shelton, Rev. Mr. Empson and Major Latour.

The following *Library Committee* was also elected.—Messrs. Hicks, Donald, Brissette, Bemrose, and Dr. McConnell.

A letter was read from Major de Winton, informing the Society that His Excellency the Governor General, Patron of the Society, would visit the museum during the approaching visit to Montreal.

A letter was also read from the Ottawa Field Naturalists' Club, suggesting that the Society hold its annual field meeting at Calumet, when the two Societies might exchange courtesies. The Society had replied acceding to this proposal.

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#### REPORT OF COMMITTEE ON MONUMENT TO FREDERICK PURSH.

At the last annual meeting of the Natural History Society, mention was made of the effort in progress, under the care of a *Committee of our Council*, to erect a monument over the neglected remains of one of the early scientific explorers of Canada, to whose labours the botany of this country owes very much. This labour of love has now been completed, and a neat monument, paid for by the subscriptions of members of the Society, now marks his resting place in Mount Royal Cemetery. The following notes on the life of Pursh, prepared originally by the late Dr. Barnston, should now be placed on record in the *Naturalist*, as a further tribute to his memory, and a reason for the interest taken in the matter by this Society.

Frederick Pursh was a German by birth and education. He pursued a successful course of study in Dresden, and acquired, at an early age, a taste for science and a peculiar fondness for botanical and horticultural pursuits. He contemplated with pleasure and admiration the many beautiful and singular flowers, the fine shrubs and ornamental trees that adorned the gardens and pleasure grounds, and which were natural productions of North America. This excited in his mind a strong desire to visit the New Continent—to observe in their natural soil and climate these same plants, the study of which had afforded him so much gratification, and to make such discoveries as circumstances might throw in his way. Accordingly, in 1799 he embarked for the United States, where he at once commenced his

researches as a scientific and practical botanist. He devoted his time to the field, the forest and the glen, and enriched his own extensive collections by valuable additions from the herbaria of the United States botanists with whom he became acquainted. His labors, however, were not confined simply to the formation of an herbarium. He rendered his researches of great value by introducing into the garden many beautiful herbs and shrubs whose cultivation has since been greatly extended. Having thus labored assiduously for a period of twelve years, during which time he discovered many new and rare plants, and ascertained the soil, situation and range of country in which each species was found, he proceeded to England, with the intention of publishing his researches. The materials he now possessed, together with the information obtained from collections which he consulted in England formed the basis of his "*Flora America Septentrionalis*," in two volumes—a work which immediately gave him a high position among men of science, and secured to his name an authority on American botany that will be always recognized.

The success of the publication and the interest excited by his discoveries induced him, under favorable auspices, to further prosecute his researches in the Canadas—a country then presenting a wide field for original botanical investigations. He accordingly arrived in the Lower Province, with the view of forming a complete herbarium of Canadian plants—of ascertaining the natural resources of the soil, and improving the system of horticulture. His labors, however, were not of long duration and not without many drawbacks. After having botanized a large portion of Eastern Canada, and made a considerable collection of plants (which were subsequently destroyed by fire), he died in Montreal in July, 1820—so destitute of means that the expense of his burial and other outlays were defrayed by his friends.

Pursh possessed a happy temperament, a kind and generous disposition, and was a universal favorite among gardeners, whose interests he served by every means in his power. The remains when disinterred were identified by the following inscription, which was clearly preserved on the plate attached to the coffin :

FREDERICK PURSH,

Died 11th July, 1820.

AGED 46 YEARS.

The spirit with which he entered into his work is shown by the following paragraph from the "*Flora Americae Septentrionalis*":

"Among the numerous useful and interesting objects of natural history discovered in the vast extent of the new continent none claim our attention in a higher degree than the vegetable productions of North America. Her forests produce an endless variety of useful and stately timber trees, her woods and hedges the most ornamental flowering shrubs, so much admired in our pleasure grounds, and her fields and meadows exceedingly handsome and singular flowers different from those of other countries. All these are more or less capable of being adapted to a European climate, and the greater part of easy cultivation and quick growth; which circumstances have given them, with much propriety, the first rank in ornamental gardening.

"A country so highly abundant in all the objects of my favorite pursuits, excited in me, at an early period of life, a strong desire to visit it, and to observe in their natural soil and climate the plants which I then knew, and to make such discoveries as circumstances might throw in my way. This plan I carried into execution in the year 1799, when I left Dresden, the place where I had received my education, and embarked for Baltimore in Maryland, with a determination not to return to Europe until I should have examined that country to the utmost extent of my means and abilities. In 1811, after an absence of nearly twelve years, I returned to Europe with an ample stock of materials towards a Flora of North America, an attempt at which I now venture to lay before the public, with a flattering hope that a generous allowance will be made for its unavoidable imperfections, when the extent of the undertaking is considered; and that it will be accepted, as it really is intended, as only the ground work of some future more perfect work upon the subject."

In this introduction he gives an account of his travels, which shows the immense amount of pains taken to gather correct information. On his arrival he made the acquaintance of several botanists whose observations were of great assistance to him. In the beginning of 1805 he set out for the mountains and western territories of the Southern States, beginning at Maryland and extending to the Carolinas (in which tract the interesting and high mountains of Virginia and Carolina took his particular attention), and returning late in autumn through the lower

countries along the sea-coast to Philadelphia. In 1806 he went in a like manner over the Northern States, beginning with the mountains of Pennsylvania and extending to those of New Hampshire (in which tract he traversed the extensive country of the lesser and great lakes) and returned as before by the sea coast. Both these tours he made on foot, travelling over an extent of more than three thousand miles each season, with no other companions than his dog and gun, frequently taking up his lodgings in the midst of wild mountains and impenetrable forests, far remote from the habitations of man. After his return, while making arrangements for the publication of his materials, he was called upon to take the management of the Botanic Garden of New York, and in 1807 took charge of that establishment. In 1810 he took a voyage to the West Indies, visiting the Islands of Barbadoes, Martinique, Dominique, Guadalupe and St. Bartholomew's, from which he returned in the autumn of 1811. He next went to London, Eng., where he very soon became acquainted with those who were very much attached to the science of botany, amongst whom were Sir Joseph Banks and A. B. Lambert, Esq., who greatly assisted him in the publication of his work. On its completion he came to Canada, where he died.

Pursh was interred in the old cemetery in Papineau road. There his remains lay neglected till 1857, when the facts becoming known to the late Dr. Barnston and other gentlemen connected with the Botanical Society of Montreal, the bones were removed to the Mount Royal Cemetery, and an effort was made to secure means to erect a suitable monument. The untimely death of Dr. Barnston arrested this monument; and with his death the Botanical Society itself became extinct. Attention was again directed to the subject in 1877, principally at the instance of the late Dr. John Bell, and a Committee of the Natural History Society, consisting of the President, Treasurer, and members of the Council, were enabled to carry this tribute to a too long neglected man of science to a successful issue. It should be added that, on the request of the Committee, the Trustees of the Mount Royal Cemetery liberally contributed to the object by the grant of a lot in a retired and beautiful portion of the cemetery, such as a lover of nature like Pursh might have himself selected as his last earthly resting place.

*Dr.* THE NATURAL HISTORY SOCIETY OF MONTREAL *in account with* E. E. SHELTON, *Treasurer.* *Cr.*

1878—'79.		
To cash paid	Printing and advertising .....	\$77.05
"	Mr. Caulfield, salary .....	233.75
"	Mr. Passmore, salary .....	400.00
"	Do, attendance .....	9.75
"	Messrs. Foote and Wilson, commission .....	13.25
"	Coal and wood .....	128.64
"	Gas bill .....	92.90
"	City taxes .....	128.51
"	Insurance .....	35.00
"	Repairs and petty expenses .....	174.91
"	Interest Royal Institution .....	75.00
"	Dawson Brothers .....	235.20
"	Shearer & Co., cupboards, &c .....	69.20
"	Pursh Monument .....	90.00
"	Balance on hand .....	237.22
		<hr/> \$2000.38
		<hr/>
		\$2000.38

LIABILITIES.

Mortgage Royal Institution .....	\$1000
Due Dawson Bros .....	175
	<hr/>
	\$1175

Montreal, May 19, 1879.

Examined, audited and found correct.

G. L. MARLER, }  
M. H. BRISSETTE, } *Auditors.*

## MISCELLANEOUS.

At the meeting of the London Geological Society, held March 12th, the following papers among others were read:—*The gold-leads of Nova Scotia*, by Henry S. Poole, F.G.S., Government Inspector of Mines. The author remarked upon the peculiarity that the gold-leads of Nova Scotia are generally conformable with the beds in which they occur, whence Dr. Sterry Hunt and others have come to the conclusion that these auriferous quartz veins are interstratified with the argillaceous rocks of the district. With this view he does not agree. He classified the leads in these groups according to their relations to the containing rocks, and detailed the results of mining experience in the district, as showing the leads to be true veins by the following characters: (1) Irregularity of planes of contact between slate and quartz; (2) The crushed state of the slate on some foot-walls; (3) Irregularity of mineral contents; (4) The termination of the leads; (5) The effects of contemporary dislocations; (6) The influence of strings and offshoots on the richness of leads. The author further treated of the relative age of the leads and granite, and combated the view that the granites are of metamorphic origin, which he stated to be disproved by a study of the lines of contact. He also noticed the effects of glaciation on the leads, and the occurrence of gold in carboniferous conglomerate.—*On conodonts from the Chazy and Cincinnati groups of the Cambro-Silurian, and from the Hamilton and Genesec-shale divisions of the Devonian, in Canada and the United States*, by G. Jennings Hinde, F.G.S. After a sketch of the bibliography of the subject, the author described the occurrence of conodonts. In the Chazy beds they are associated with numerous *Leperditæ*, some triobolites and gasteropods; in the Cincinnati group with various fossils; and in the Devonian strata principally with fish-remains; but there is no clue to their nature from these associated fossils. They possess the same microscopic lamellar structures as the Russian conodonts described by Pander. The various affinities exhibited by the fossil conodonts were discussed; and the author is of opinion that though they most resemble the teeth of myxinoid fishes, their true zoological relationship is very uncer-

tain. The paper concluded with a classification of the conodonts from the above deposits.—*On Annelid Jaws from the Cambro-Silurian, Silurian and Devonian formations in Canada, and from the Lower Carboniferous in Scotland*, by G. Jennings Hinde, F.G.S. After referring to the very few recorded instances of the discovery of any portions of the organisms of errant annelids as distinct from their trails and impression in the rocks, the author noticed the characters of the strata, principally shallow-water deposits in which the annelid jaws described by him are imbedded. A description was given of the principal varieties of form and of the structure of the jaws. They were classified from their resemblance to existing forms under seven genera, five of which are included in the family Eunicea, one in the family Lycoridea, and one among the Glycerea. The author enumerated fifty-five different forms, the greater proportion of which are from the Cincinnati group.—*Nature*.

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CONVOLUTA SCHULTZII.—An important line of demarcation between the vegetable and animal world has been removed by recent investigation. Plants assimilate carbonic acid, give off oxygen, and form starch. By experiments on a species of Planaria, a flat worm, described as *Convoluta Schultzii*, Mr. P. Geddes has demonstrated that that animal disengages oxygen in large quantity, decomposes carbonic acid, and produces starch. This worm abounds in the shallow water on the margin of the sea, and on exposure to sunlight pours forth a stream of bubbles containing, as proved by analysis, from forty-five to fifty-five per cent. of oxygen. And on subjecting a number of Planaria to chemical treatment, a quantity of ordinary vegetable starch was obtained. Pointing out the significance of these facts in the *Proceedings* of the Royal Society, Mr. Geddes says: 'As the *Drosera* and *Dionaea* [two species of well-known vegetable Fly-traps], which have attracted so much attention of late years, have received the striking name of Carnivorous Plants, these Planarians may not unfairly be called Vegetating Animals, for the one case is the precise reciprocal of the other. Not only does the *Dionaea* imitate the carnivorous animal, and the *Convoluta* the ordinary green plant, but each tends to lose its own normal character.'—*Chambers's Journal*.

**SIMPLE METHOD OF CONVERTING IRON INTO STEEL.**—After many years of trials and experiments to convert iron into steel by a short and simple process, the endeavour has been crowned by success. In Cleveland, that north-eastern corner of Yorkshire, where iron ore is as abundant as salt in the sea, excitement prevails, and years of prosperity are anticipated; and it may fairly be assumed that all ironstone districts will be stimulated into activity by this last metallurgical discovery. As is pretty well known, the long-standing difficulty had been to get rid of the phosphorus present in the iron, and many were the ingenious devices put in practice to overcome it. At length Mr. Sidney G. Thomas, F.C.S., commenced a series of experiments on the effect of different materials as a lining for the 'converter'—the receptacle in which the molten metal is subjected to the blast. Experience had demonstrated that the usual siliceous lining favoured retention of the phosphorus; but what other could be devised that would resist the intense heat? By perseverance the alternative—a mixture of limestone and silicate of soda—was discovered. This expelled the phosphorus. The preliminary results, necessarily on a small scale, were confirmed by large experiments made at the Blaenavon Iron works, in Wales; and now the process has been adopted by one of the leading firms in the Cleveland district, by whom it will be fully developed, and the conversion of 'pig' into good steel, free from phosphorus, will become an everyday operation. Shall we see as a consequence modification and quickening in the manufacture of machinery and ships; and will cheap steel have any effect on the trade of Sheffield and Birmingham?—*Ibid.*

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**GEOLOGICAL DISCOVERY AT CHARING CROSS, LONDON.**—An interesting geological discovery has just been made in the heart of London. In making the excavations at Charing Cross for Messrs. Drummond's new bank, the workmen, at depths varying from fifteen to thirty feet, came upon the fossil remains of several extinct animals. They include elephant tusks and molars (probably the mammoth *Elephas primigenius*), a portion of what appears to be the horn of the great extinct Irish deer (*Megaceros Hibernicus*), along with other remains of ruminating animals not identified. All the remains are those of herbivorous quadrupeds, but there is among them no bone or tooth of hippopotamus



or rhinoceros, though these huge beasts are known from discoveries made at Brentford, Crayford, and other localities in the Thames Valley, to have been in times long gone by the companions of the Thames Valley mammoths. The specimen in this collection which has specially attracted the attention of gentlemen learned in the study of fossil osteology is the terminal point of an elephant tusk, unusually sharp at the point and highly polished, and from the surface of which a very thin skin of ivory peels off, exposing a strongly and regularly longitudinally channelled surface beneath.

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A NEW CHEMICAL INDUSTRY.—A lecture was, a short time ago, delivered by Prof. Roscoe, at the Royal Institution, on a new chemical industry which has originated and developed in France to a considerable extent within the last two or three years. M. Vincent, *répétiteur* at the Ecole Centrale at Paris, and directing chemist of the great distillery works at Courrières, has succeeded in putting to good use what has hitherto been a waste product. Instead of burning the residue of beet-root molasses—after the alcohol has been distilled from it—in the open air for the purpose of obtaining the potash salts it contains, he performs the calcination in closed retorts, in order to secure the products of distillation. Among those he found a large quantity of trimethylamine, which can be easily worked up into chloride of methyl. This gaseous body, reduced through pressure to a liquid, is an excellent material for frigorific purposes. By its own evaporation the bulk of the liquid acquires a temperature of  $-23^{\circ}$  C., and when the evaporation is assisted by the passage of dry air through the liquid the temperature is brought as low as  $-55^{\circ}$  C. Prof. Roscoe was able to freeze in this way a mass of mercury of several pounds weight into a hard solid, which he hammered like a piece of lead. The other and more important use of chloride of methyl is in the manufacture of those beautiful dyes known as methylated anilines. They had been known before, but the cost of their production was so high that their consumption was only limited. The cheapening of the chloride of methyl has greatly extended and will continue to extend the preparation of those colours.—*Athenæum*.