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The Canadian Journal.

TORONTO, JULY, 1855.

Incidents of Travel on the North-West Coast, Vancouver's Island, Oregon, &c., &c.,

BY PAUL KANE, ESQ., TORONTO.

THE CHINOOK INDIANS.

(Read before the Canadian Institute, March 14th.)*

As it would be impossible for me in the confined limits of a paper like the present to give anything like a detailed account of all the tribes of Indians amongst whom I have travelled, I have considered that it would prove far more interesting were I to confine myself to one tribe, and give full information regarding their habits, customs and traditions. For this purpose I have selected the Chinooks, one of the tribes among whom I have been, most remote from this part of the continent, and whose manners and customs are so much at variance with our own, as, I trust, to render some notice of them, from personal observation, novel and interesting.

The Flat-Head Indians are met with along the banks of the Columbia river from its mouth eastward to the Cascades, a distance of about 130 miles; they extend up the Walamett river south about 30 or 40 miles, and through the district lying between the Walamett and Fort Astoria, now called Fort George. To the north they extend along the Cowlitz river and the tract of land lying between that and Puget's Sound. About two-thirds of Vancouver's Island is also occupied by them, and they are found along the coasts of Puget's Sound and the Straits of Juan de Fuca. The Flat-Heads are divided into numerous tribes, each having its own peculiar locality, and differing more or less from the others in language, customs and manners.

Of these I shall select, as the subject of the present paper, the Chinooks, a tribe inhabiting the tract of country at the mouth of the Columbia river. Residing among the Flat-Heads I remained from the fall of 1846 to the following autumn of 1847, and had consequently ample opportunity of becoming acquainted with the peculiar habits and customs of the tribe. They are governed by a Chief called Casenov. This name has no translation. The Indians on the west side of the Rocky Mountains differing from those on the east, in having hereditary names, to which no particular meaning appears to be attached, and the derivation of which is in many instances forgotten. Casenov is a man of advanced age, and resides principally at Fort Vancouver, about 90 miles from the mouth of the Columbia. I made a sketch of him while staying there, and obtained the following information as to his history and previous career:—Previous to 1829 Casenov was considered a great warrior, and could lead into the field 1,000 men, but in that year the Hudson's Bay Company and emigrants from the United States introduced the plough for the first time into Oregon, and the locality hitherto considered one of the most healthy was almost depopulated by the fever and ague.

Their principal settlement, Chinook Point, where King Cumcomley ruled in 1811, at the mouth of the river, was nearly reduced to one-half its numbers. The Klatsup village now contains but a small remnant of its former inhabitants. Wasiackum, Catlamet, Kullowith, the settlements at the mouth of the Cowlitz, Kallemo, Kattlepootle and Walkumup are entirely extinct as villages. On Soveys Island there were formerly four villages but now there scarcely remains a lodge.

They died of this disease in such numbers that their bodies lay unburied on the river's banks, and many were to be met with floating down the stream.

The Hudson's Bay Company supplied them liberally with Quinine and other medicines, but their good effects were almost entirely counteracted by their mode of living, and their obstinacy in persisting in their own peculiar mode of treatment, which consisted principally in plunging into the river without reference to the particular crisis of the disease.

From these two causes their numbers have been very much reduced, and the effective power of the tribes so greatly diminished that the influence which Casenov owed to the number of his followers has correspondingly declined; his own immediate family consisting of ten wives, four children and eighteen slaves, being reduced in one year to one wife, one child and two slaves. Their decrease since that time has also been fearfully accelerated by the introduction of ardent spirits, which, in spite of prohibition and fines against selling it to Indians, they manage to obtain from their vicinity to Oregon city, where whiskey, or a poisonous compound called there *blue ruin*, is illicitly distilled. I have scarcely ever seen an Indian in that vicinity who would not get drunk if he could procure the means, and it is a matter of astonishment how very small a quantity suffices to intoxicate these unfortunate beings, although they always dilute it largely in order to prolong the pleasure they derive from drinking. Casenov is a man of more than ordinary talent for an Indian, and he has maintained his great influence over his tribe chiefly by means of the superstitious dread in which they hold him.

This influence was wielded with unflinching severity towards them, although he has ever proved himself the firm friend of the white man. Casenov for many years in the early period of his life kept a hired assassin to remove any obnoxious individual against whom he entertained personal enmity.

This bravo, whose occupation was no secret, went by the name of Casenov's *Sko oom* or evil genius. He finally fell in love with one of Casenov's wives who eloped with him; Casenov vowed vengeance, but the pair for a long time eluded his search, until one day he met her in a canoe near the mouth of the Cowlitz river and shot her on the spot. After this he lived in such continual dread of the lover's vengeance that for nearly a year he never ventured to sleep, but in the midst of a body guard of 40 armed warriors, until at last he succeeded in tracing him out, and had him assassinated by the man who had succeeded him in his old office. The Chinooks over whom Casenov presides carry the process of flattening the head to a greater extent than any other of the Flat-Head tribes.

The process is as follows:—The Indian mothers all carry their infants strapped to a piece of board covered with moss or loose fibres of cedar bark, and in order to flatten the head they place a pad on its forehead, on the top of which is laid a piece of smooth bark bound on by a leathern band passing through holes in the board on either side and kept tightly pressed across the front of the head. A sort of pillow of grass or cedar fibres being placed under the back of the neck to support it.

This process commences with the birth of the infant and is

* Various articles of dress worn by the Chinook Indians, specimens of their bows and arrows, spears, cooking utensils, and a skull taken from one of their graves, were exhibited. Several admirable oil paintings, executed by Mr. Kane, illustrated many important features of the lives and characters of the Chinook Indians. (See proceedings of the Canadian Institute, March 14th, page 244. *Canadian Journal.*)

continued for a period of from 8 to 12 months, by which time the head has lost its natural shape and acquired that of a wedge, the front of the skull becoming flat, broad and higher at the crown, giving it a most unnatural appearance.

Many people would suppose that from the extent to which this is carried the operation would be attended with great suffering to the infant, but I have never heard the infants crying or moaning, although I have seen the eyes seemingly starting out of the sockets from the great pressure. But on the contrary, when the lashings were removed I have noticed them cry until they were replaced.

From the apparent dullness of the children whilst under the pressure I should imagine that a state of torpor or insensibility is induced, and that the return to consciousness occasioned by its removal must be naturally followed by the sense of pain.

This unnatural operation does not however seem to injure the health, the mortality amongst the Flat-Head children not being perceptibly greater than amongst other Indian tribes. Nor does it seem to injure their intellect, on the contrary, the Flat-Heads are generally considered fully as intelligent as the surrounding tribes who allow their heads to preserve their natural shape; and it is from amongst the round-heads that the Flat-Heads take their slaves; looking with contempt even upon the whites for having round heads, the *flat-head* being considered as the distinguishing mark of freedom. I may here remark, that, amongst the tribes who have slaves there is always something which conspicuously marks the difference between the slave and the free, such as the Chimseyan, who wear a ring in the nose, and the Babbenes who have a large piece of wood inserted through the under lip. The Chinooks, like all other Indian tribes, pluck out the beard on its first appearance.

I would willingly give a specimen of the barbarous language of these people, were it possible to represent by any combination of the letters of our alphabet the horrible harsh spluttering sounds which proceed from their throats, apparently unguided either by the tongue or lips.

It is so difficult to acquire a mastery of their language that none have been able to attain it unless those who have been born amongst them.

They have, however, by their intercourse with the English and French traders succeeded in amalgamating, after a fashion, some words of each of these tongues with their own and formed a sort of Patois, barbarous enough certainly, but still sufficient to enable them to communicate with the traders.

This Patois I was enabled, after some short time, to acquire, and could converse with most of the chiefs with tolerable ease. There common salutation is *Clah hoh oh yah*, originating, as I believe, in their having heard in the early days of the fur trade a gentleman named Clark frequently addressed by his friends, "Clark, how are you?" This salutation is now applied to every white man, their own language affording no appropriate expression.

Their language is also peculiar in containing no oaths, or any words conveying gratitude or thanks.

Their habits are extremely filthy, their persons abounding with vermin, and one of their chief amusements consists in picking these disgusting insects from each others' heads and eating them. On my asking an Indian one day why he ate them, he replied that they bit him and he gratified his revenge by biting them in return. It will naturally be supposed that they are thus beset from want of combs or other means of displacing the intruders; but this is not the case, they pride themselves on carrying such companions about them, and giving their friends the opportunity of amusing themselves in hunting and eating them.

The costume of the men consists of a musk-rat skin robe, the size of one of our ordinary blankets, thrown over the shoulders, without any breach-cloth, moccassins or leggings.

Painting the face is not much practised amongst them except on extraordinary occasions, such as the death of a relative, some solemn feast, or going on a war party.

The female dress consists of a girdle of cedar bark round the waist, with a dense mass of strings of the same material hanging from it all around and reaching almost to the knees. This is their sole summer habiliment.

They, however, in very severe weather add the musk-rat blanket. They also make another description of blanket from the skin of the wild goose, which is here taken in great abundance. The skin is stripped from the bird with the feathers on and cut into strips, which they twist so as to have the feathers outwards. This makes a feathered cord, and is then netted together so as to form a blanket, the feathers filling up the meshes, rendering it a light and very warm covering.

In the summer these are entirely thrown aside, not being in any case worn from feelings of delicacy.

The men go quite naked, though the women always wear the cedar petticoat. The country which the Chinooks inhabit being almost destitute of furs they have little to trade in with the whites.

This, coupled with their laziness—probably induced by the ease with which they procure fish, which is their chief subsistence—prevents their obtaining ornaments of European manufacture, consequently anything of the kind is seldom seen amongst them. They, however, wear long strings of small shells found on the coast called Ioquas, and used by them also as money.

A great traffic is carried on amongst all the tribes through the medium of these shells. They are fished up from the bottom of the sea, and are from an inch and a-half to two inches in length; they are white, slender, hollow and tapering to a point, slightly curved and about the size of the stem of an ordinary clay tobacco pipe. They are valuable in proportion to their length, and their value increases according to a fixed ratio, forty shells being the standard number required to extend a fathoms' length, which number is in that case equal in value to a beaver's skin, but if 39 be found long enough to make the fathom it would be worth 2 beaver skins, if 38 three skins, and so on, increasing one beaver skin for every shell less than the standard number.

The Chinooks evince very little taste in comparison with some of the tribes on the eastern side of the Rocky Mountains, in ornamenting either their persons or their warlike or domestic implements.

The only utensils I saw at all creditable to their decorative skill were carved bowls and spoons of horn, and baskets made of roots and grass woven so closely as to serve all the purposes of a pail in holding and carrying water.

In these they even boil the salmon which constitute their principal food. This is done by immersing the fish in one of the baskets filled with water, into which they throw red hot stones until the fish is cooked, and I have seen fish dressed as expeditiously by them in this way as if done in a kettle over a fire by our own people. The salmon is taken during the months of June and July in immense numbers in the Columbia river and its tributaries by spearing and with gill nets.

They have also a small hand net something like our common landing net, which is used in rapids where the salmon are crowded together and near the surface.

These nets are ingeniously contrived, so that when a fish is in them his own struggles loosen a little stick which keeps the mouth of the net open while empty, but which, when the net is full, immediately draws it together like a purse with the weight of the salmon and effectually secures the prey.

The salmon taken during this period of the year is split open and dried in the sun for their winter's supply. I have never seen salt made use of by any tribe of Indians for the purpose of preserving food, and they all evince the greatest dislike to salt meat.

I may here mention a curious fact respecting the salmon of the Columbia river; they have never been known to rise to a fly, although it has been frequently tried by gentlemen of the Hudson's Bay Company, with the very best tackle. The salmon go up the river as far as they possibly can and into all its tributary streams in myriads; it is, however, a well known fact that after spawning they never return to the sea, but all die in the river; the Columbia is hardly ever free from gill nets, and no salmon has ever been taken returning, and in the fall, wherever still water occurs, the whole place is tainted by their putrid bodies floating in immense masses. I have been obliged to travel through a whole night trying to find an encampment which would be free from their disgusting effluvia.

The Chinooks also catch a considerable number of sturgeon, which here attain to an enormous size, weighing from four to six cwt.; this is done by means of a long-jointed spear handle 70 or 80 feet in length, fitted into but not actually fastened to a barbed spear-head, to which is attached a line, with this they feel along the bottom of the river, where the sturgeon are found lying at the spawning season; upon feeling the fish the barbed spear is driven in and the handle withdrawn. The fish is then gradually drawn in by the line, which being very long allows the sturgeon room to waste his great strength so that he can with safety be taken into the canoe or towed ashore.

At the mouth of the river a very small fish, about the size of our Sardines, is caught in immense numbers, it is called there Uhlékun, and is much prized on account of its delicacy and extraordinary fatness. When dried this fish will burn from one end to the other with a clear steady light like a candle. The Uhlékuns are caught with astonishing rapidity by means of an instrument about 7 feet long, the handle is about 3 feet, into which is fixed a curved wooden blade about 4 feet, something the shape of a sabre, with the edge at the back. In this edge, at the distance of an inch and a-half, are inserted sharp bone teeth about an inch long, the Indian standing in the canoe draws this edgeways with both hands, holding it like a paddle, rapidly through the dense schools of fish, which are so thick that almost every tooth will strike a fish. One knock across the thwarts safely deposits them in the bottom of the canoe. This is done with such rapidity that they will not use nets for this description of fishing.

There are few whales now caught on the coast, but the Indians are most enthusiastic in the hunt. Upon a whale being seen blowing in the offing they rush down to their large canoes and push off, with 10 or 12 men in each; each canoe is furnished with a number of strong seal skin bags filled with air, and made with great care and skill, capable of containing about 10 gallons each, to each bag is attached a barbed spear-head by a strong string about 8 or 9 feet long, and in the socket of the spear-head is fitted a handle 5 or 6 feet in length. Upon coming up with the whale the barbed heads with the bags attached are driven into the whale and the handles withdrawn. The attack is continually renewed until the whale is no longer able to sink from the buoyancy of the bags, when he is despatched and towed ashore. The blubber of the whale is much prized amongst them, and is cut into stripes about 2 feet long and 4 inches wide and eaten generally by them with their dried fish.

Clams and oysters are very abundant, and seals, wild ducks and geese are taken in great plenty, but their fishing is so productive that they subsist with very little labour.

They are also very fond of herrings' roe, which they collect in the following manner:—They sink cedar branches to the bottom of the river, in shallow places, by placing upon them a few heavy stones, taking care not to cover the green foliage, as the fish prefer spawning on anything green, and they literally cover all the branches by next morning with spawn. The Indians wash this off in their water-proof baskets, to the bottom of which it sinks; this is squeezed by the hand into little balls and then dried, and is very palatable.

The only vegetables in use amongst them are the Camas and Wappattoo. The Camas is a bulbous root much resembling the onion in outward appearance but is more like the potato when cooked and is very good eating. The Wappattoo is somewhat similar but larger and not so dry or delicate in its flavour. They are found in immense quantities in the plains in the vicinity of Fort Vancouver, and in the spring of the year present a most curious and beautiful appearance, the whole surface presenting an uninterrupted sheet of bright ultramarine blue from the innumerable blossoms of these plants. They are cooked by digging a hole in the ground, then putting down a layer of hot stones, covering them with dry grass, on which the roots are placed; they are then covered with a layer of grass, and on the top of this they place earth, with a small hole perforated through the earth and grass down to the vegetables. Into this they pour water, which, reaching the hot stones, forms sufficient steam to completely cook the roots in a short time, the hole being immediately stopped up after the introduction of the water. They often adopt the same ingenious process for cooking their fish, meat, and game.

There is another article of food made use of amongst them, which from its disgusting nature I should have been tempted to omit were it not a peculiarly characteristic trait of the Chinook Indian, both from its extraordinary character, and its use being confined solely to this tribe; it is, however, regarded only as a luxury and not as a general article of food. The whites have given it the name of Chinook Olives, and it is prepared as follows:—About a bushel of acorns are placed in a hole dug for the purpose close to the entrance of the lodge or hut, and covered over with a thin layer of grass, on top of which is laid about half a foot of earth; every member of the family henceforth regards this hole as the special place of deposit for their urine, which is on no occasion to be diverted from its legitimate receptacle, even should a member of the family be sick and unable to reach it for this purpose the fluid is carefully collected and carried thither. However disgusting such an odoriferous preparation would be to people in civilized life the product is regarded by them as the greatest of all delicacies; so great indeed is the fondness they evince for this horrid preparation that even when brought amongst civilized society they still yearn after it and will go any length to obtain it. A gentleman in charge of Fort George had taken to himself a wife, a woman of this tribe, who of course partook with himself of the best food the Fort could furnish; notwithstanding which, when he returned home one day his nostrils were regaled with a stench so nauseating that he at once enquired where she had deposited the Chinook olives, as he knew that nothing else could poison the atmosphere in such a manner.

Fearful of losing her dearly-prized luxury she strenuously denied its possession: his nose however soon led him to the place of deposit, and they were soon consigned to the river. His mortification was afterwards not a little increased by learning that she had purchased the delicacy with one of his best blankets.

During the season the Chinooks are gathering Camas and fishing they live in lodges constructed by means of a few poles covered with mats made of rushes, which can be easily moved from place to place; but in the villages they build permanent huts of split cedar boards. Having selected a dry place for the village a hole is dug about three feet deep and about twenty feet square, round the sides of this square cedar boards are sunk and fastened together with cords and twisted roots, rising about four feet above the outer level; two posts are sunk at the middle of each end with a crotch at top, on which the ridge pole is laid, and boards laid from thence to the top of the upright boards. Fastened in the same manner round the interior are erected sleeping places, one above another something like the berths in a vessel, but larger. In the centre the fire is made, the smoke of which escapes from a hole left in the roof for that purpose. These lodges are filthy beyond description and swarm with vermin. The fire is procured by means of a small flat piece of dry cedar, in which a small hollow is cut with a channel for the ignited charcoal to run over; this piece the Indian sits on to hold it steady while he rapidly twirls a round stick of the same wood between the palms of his hands with the point pressed into the hollow of the flat piece. In a very short time sparks begin to fall through the channel upon finely frayed cedar bark placed underneath which they soon ignite. There is a great deal of knack in doing this, but those who are used to it will light a fire in a very short time. The men usually carry these sticks about with them, as after they have been once used they produce the fire quicker.

The only warlike implements I have seen amongst them were bows and arrows. The bows are made from the Yew tree, and the arrows are feathered and pointed with sharp bone. These they use with great precision.

Their canoes are hollowed out of the cedar, and some of them are very large, as this tree grows to an immense size in the neighbourhood. They make them very light, and from their formation they are capable of withstanding very heavy seas.

Slavery is carried to a great extent along the North-West coast and in Vancouver's Island; and the Chinooks, considering how much they themselves have been reduced, still retain a large number of slaves. These are usually procured from the Chastay tribe who live near the Umqua, a river south of the Columbia emptying into the Pacific. They are sometimes seized by war parties, but are often bought from their own people. They do not flatten the head, nor is the child of one of them (although by a Chinook father), allowed this distinguishing mark of freedom. Their slavery is of the most abject description: the Chinook men and women treat them with great severity, and exercise the power of life and death at pleasure. An instance of the manner in which the Chastay slaves are treated presented itself to my own observation one morning while I was out sketching on Vancouver's Island. I saw upon the rocks the dead body of a young woman whom I had seen a few days previously walking about in perfect health, thrown out to the vultures and crows. I mentioned it to a gentleman of the Hudson's Bay Coy., who accompanied me to the lodge she belonged to, where we found an Indian woman, her mistress, who made light of her death, and who was no doubt the cause of it. She said a slave had no right to burial. She was furious on being told that the slave was as good as herself. "She, the daughter of a chief, no better than a slave." She then stalked out of the lodge with great dignity; the next morning she had taken down the lodge and was gone. I was also told by an eye witness, of a chief who, having erected a colossal idol of wood, sacrificed five slaves to it, barbarously murdering them at its base, and asking in a boasting tone who among them could afford to kill so many slaves. One of the slaves was a handsome girl who had lived from her infancy in his family, and begged most piteously for her life, reminding him of the care she had taken of his children and all the services she had rendered; but all her pleadings were of no avail, and the brutal wretch with his own hand plunged a knife four times into her body before she ceased her appeals for mercy. The only distinction made in her favour was that she was buried, instead of being, like her miserable companions, thrown out on the beach.

The principal amusement of the Chinooks is gambling, which is carried to great excess amongst them. You never visit the camp but you hear the eternal gambling song of "he ha, ha," accompanied by the beating of small sticks on some hollow substance. Their games do not exceed two or three, and are of a simple nature. The one most generally played consists in holding in each hand a small piece of stick the thickness of a goose quill and about an inch and a-half in length, one plain and the other distinguished by a little thread wound round it, the opposite party being required to guess in which hand the marked stick is to be found. A Chinook will play at this simple game for days and nights together until he has gambled away everything he possesses even to his wife. They play, however, with much equanimity, and I never saw any ill-feeling evinced by the loser against his successful opponent. They will cheat if they can, and pride themselves on its success; if detected no unpleasant consequence follows, the offending party being merely laughed at and allowed to amend his play.

Another game to which they are very partial is played by two or three on each side; the rivals sit on the ground opposite each other with the stakes lying in the centre, one begins with his hands on the ground in which he holds four small sticks covered from sight by a small mat, these he arranges in any one of a certain number of forms prescribed by the rules of the game, and his opponent on the opposite side endeavours to guess which form he has chosen; if successful a stick is stuck up in his favour, and the sticks are handed to the next, if not the player counts and still goes on till discovered. When those on one side have gone through the others commence. At the conclusion the sticks are counted and the greater number wins. This game is also accompanied by singing, in which all the bystanders join.

Another game which I have seen amongst them is called Al-kol-loch, and is one that is universal along the Columbia river. It is considered the most interesting and important as it requires great skill. A smooth level piece of ground is chosen, and a slight barrier of a couple of sticks laid lengthways is made at each end; these are 40 or 50 feet apart and a few inches high, the two opponents, stripped naked, are armed each with a very slight spear about 3 feet long and finely pointed with bone; one of them takes a ring made of bone or some heavy wood, and wound round with cord about three inches in diameter, on the inner circumference of which are fastened six beads of different colours at equal distances, to each of which a separate numerical value is attached; the ring is then rolled along the ground to one of the barriers and is followed at the distance of

2 or 3 yards by the players, and as the ring strikes the barrier and is falling on its side the spears are thrown so that the ring may fall on them; if only one of the spears should be covered by the ring the owner of it counts according to the coloured bead over it. But it generally happens, from the dexterity of the players, that the ring covers both spears, and each count according to the colours of the beads above his weapon. They then play towards the other barrier, and so on until one party has attained the number agreed upon for game.

The Chinooks have tolerably good horses, and are fond of racing, at which they bet considerably; they are expert jockeys and ride fearlessly.

They also take great delight in a game with a ball, which is played by them in the same manner as by the Cree, Chippewa and Sioux Indians. Two poles are erected about a mile apart, and the company is divided into two bands armed with sticks, having a small ring or hoop at the end with which the ball is picked up and thrown to a great distance, each party then strives to get the ball past their own goal. There are sometimes hundreds on a side, and the play is kept up with great noise and excitement. At this game they also bet heavily, as it is generally played between tribes or villages.

The sepulchral rites of this singular tribe of Indians are too curious to be entirely omitted. Upon the death of a Chinook the body is securely tied up in rush matting and placed in the best canoe they can procure, without any peculiar ceremonies. This canoe is as highly decorated as the family of the deceased can afford. Tin cups, kettles, plates, pieces of cotton, red cloth, and furs, and in fact everything which they themselves most value, and which is most difficult for them to obtain, are hung round the canoe; inside, beside the body, they place paddles, spears, bows and arrows, and food, with everything else which they consider necessary for a very long journey,—I have even found beads, Ioquas shells, brass buttons and small coins in the mouths of the skeletons,—the canoe is then taken to the burial place of the tribe, generally selected for its isolated situation. The two principal places are rocky Islands in the lower part of the Columbia river; one is called Coffin Rock from the appearance it presents, covered with the raised biers of the deceased members of the tribe; to these they tow the canoe, which is then either fastened up in a tree or supported on a sort of frame 4 or 5 feet from the ground made of strong cedar boards, and holes bored in the bottom of the canoe to let the water run out, they are then covered with a large piece of bark to protect them from the rain. Before leaving they destroy the usefulness of every article left with the corpse, making holes in the kettles, cans, and baskets, cracking the bows, arrows and spears, and if there is a gun they take the lock off, believing that the Great Spirit will mend them upon the deceased arriving at the hunting grounds of their Elysium. The greatest crime which an Indian can commit in the eyes of his people is that of desecrating one of these canoes, and it very seldom happens that the slightest thing is removed.

In obtaining a specimen of one of the peculiarly formed skulls of the tribe I had to use the greatest precaution, and ran no small risk not only in getting it but in having it in my possession afterwards; even the voyageurs would have refused to travel with me had they known that I had it among my collections, not only on account of the superstitious dread in which they hold these burial places, but also on account of the danger arising from a discovery, which might have cost the lives of the whole party.

A few years before my arrival at Fort Vancouver, Mr. Douglass, who was then in charge, heard from his office the report of a gun inside the gates, this being a breach of discipline he hurried out to enquire the cause of so unusual a circumstance, and found one of Casenov's slaves standing over the body of an Indian whom he had just killed, and in the act of reloading his gun with apparent indifference, Casenov himself standing by. On Mr. Douglass arriving at the spot, he was told by Casenov, with an apology, that the man deserved death according to the laws of the tribe, who as well as the white man inflicted punishment proportionate to the nature of the offence. In this case the crime was one of the greatest an Indian could be guilty of, namely, the robbing the sepulchre canoes. Mr. Douglass after severely reprimanding him allowed him to depart with the dead body.

Sacred as the Indians hold their burial places, Casenov himself, a short time after the latter occurrence, had his only son buried in the cemetery of the Fort. He died of consumption —a disease very frequent amongst all Indians—proceeding no doubt from their constant exposure to the sudden vicissitudes of the climate. The coffin was made sufficiently large to contain all the necessaries supposed to be required for his comfort and convenience in the world of spirits. The chaplain of the Fort read the usual service at the grave, and after the conclusion of the ceremony, Casenov returned to his lodge, and the same evening attempted, as narrated below, the life of the bereaved mother, who was the daughter of the great chief generally known as King Comcomly, so beautifully alluded to in Washington Irving's "Astoria." She was formerly the wife of a Mr. McDougall, who bought her from her father for, as it was supposed, the enormous price of ten articles of each description, guns, blankets, knives, hatchets, &c., then in Fort Astoria. Comcomly, however, acted with unexpected liberality on the occasion by carpeting her path from the canoe to the Fort with sea otter skins, at that time numerous and valuable, but now scarce, and presenting them as a dowry, in reality far exceeding in value the articles at which she had been estimated. On Mr. McDougall's leaving the Indian country she became the wife of Casenov.

It is the prevailing opinion of the chiefs that they and their sons are too important to die in a natural way, and whenever the event takes place they attribute it to the malevolent influence of some other person, whom they fix upon, often in the most unaccountable manner, frequently selecting those the most dear to themselves and the deceased. The person so selected is sacrificed without hesitation. On this occasion Casenov selected the afflicted mother, notwithstanding she had during the sickness of her son been one of the most assiduous and devoted of his attendants, and of his several wives she was the one he most loved; but it is the general belief of the Indians on the west side of the mountains, that the greater the privation they inflict on themselves the greater would be the manifestation of their grief, and the more pleasing to the departed spirit. Casenov assigned to me an additional motive for his wish to kill his wife, namely, that as he knew she had been so useful to her son and so necessary to his happiness and comfort in this world, he wished to send her with him as his companion on his long journey. She, however, escaped into the woods, and next morning reached the Fort imploring protection; she was accordingly secreted for several days until her own relations took her home to Chinook Point. In the meantime a woman was found murdered in the woods and the act was universally attributed to Casenov or one of his emissaries.

I may here mention a painful occurrence which took place on Thompson's river, in New Caledonia, as illustrative of this peculiar superstition.

A chief dying, his widow considered a sacrifice as indispensable, but having selected a victim of rather too much importance, she was unable for some time to accomplish her object; at length the nephew of the chief, no longer able to bear the continual taunts of cowardice which she unceasingly heaped upon him, seized his gun and started for the Company's Fort on the river, about 20 miles distant. On arriving, he was courteously received by Mr. Black, the gentleman in charge of the Fort, who expressed great regret at the death of his old friend the chief. After presenting the Indian with something to eat and giving him some tobacco, Mr. Black turned to leave the room, and while opening the door was shot from behind by his treacherous guest and immediately expired. The murderer succeeded in escaping from the Fort, but the tribe, who were warmly attached to Mr. Black, took his revenge upon themselves and hunted him down. This was done more to evince their high esteem for Mr. Black than from any sense of impropriety in the customary sacrifice.

Amongst the Chinooks I have never heard any traditions as to their former origin, although such traditions are common amongst those on the east side of the Rocky Mountains. They do not believe in any future state of punishment, although in this world they suppose themselves exposed to the malicious designs of the Skŏcoom or evil genius, to whom they attribute all their misfortunes and ill luck. The Good Spirit is called the *Hias Soch-a-li Ti-yah*, that is the Great High Chief from whom they obtain all that is good in this life, and to whose happy and peaceful hunting grounds they will all eventually go, to reside for ever in comfort and abundance.

The medicine men of the tribe are supposed to possess a mysterious influence with these two spirits, either for good or evil, and of course possess great power in the tribe. These medicine men form a secret society, the initiation into which is accompanied with great ceremony and much expense. I witnessed, whilst amongst them, the initiation of a candidate, which was as follows:—The candidate has to prepare a feast for his friends and all who choose to partake of it, and make presents to the other medicine men. A lodge is prepared for him, which he enters and remains alone for three days and nights, without food, whilst those already initiated keep dancing and singing round the lodge during the whole time. After this fast, which is supposed to endue him with wonderful skill, he is taken up apparently lifeless and plunged into the nearest cold water, where they rub and wash him until he revives. This they call "washing the dead." As soon as he revives he runs into the woods, and soon returns dressed as a medicine man, which generally consists of the light down of the goose stuck all over their bodies and heads with thick grease, and a mantle of frazed cedar bark; with the medicine rattle in his hand he now collects all his property, blankets, shells and ornaments, and distributes the whole amongst his friends, trusting for his future support to the fees of his profession. The dancing and singing are still continued with great vigour during the division of the property, at the conclusion of which the whole party again sit down to feast, apparently with miraculous appetites, the quantity of food consumed being perfectly incredible.

I witnessed one day their mode of treatment of the sick whilst passing through a village. Hearing a horrible noise in one of the lodges, I entered it, and found an old woman supporting one of the handsomest girls of the tribe I had seen; cross-legged and naked in the middle of the room sat the medicine man with a wooden dish of water before him, twelve or fifteen other men sitting round the lodge. The object in view was to cure the girl of a disease affecting her side. As soon as my presence was noticed a space was cleared for me to sit down. The officiating medicine man appeared in a state of profuse perspiration from the exertions he had used, and soon took his seat amongst the rest as if quite exhausted; a younger medicine man then took his place in front of the bowl and close beside the patient, throwing off his blanket he commenced singing and gesticulating in the most violent manner, whilst the others kept time by beating with little sticks on hollow wooden bowls and drums, singing continually. After exercising himself in this manner for about half an hour, until the perspiration ran in streams down his body, he darted suddenly upon the young woman catching hold of her side with his teeth and shaking her for a few minutes, as one dog does another in fighting, the patient seeming to suffer great agony he then relinquished his hold, and cried out he had got it, at the same time holding his hands to his mouth, after which he plunged them in the water and pretended to hold down with great difficulty the disease which he had extracted lest it might spring out and return to its victim. At length having obtained the mastery over it, turning himself round to me in an exulting manner, he held something up between the finger and thumb of each hand, which had the appearance of a piece of cartilage, whereupon one of the Indians sharpened his knife and divided it in two, leaving one end in each hand. One of the pieces he threw into the water and the other into the fire, accompanying the action with a diabolical noise which none but a medicine man can make; after which he got up perfectly well satisfied with himself, although the poor patient seemed to me anything but relieved by the violent treatment she had undergone.

My principal object in travelling among the Indian tribes of the Far West was to obtain accurate sketches of their chiefs, medicine men, &c., and representations of their most characteristic manners and customs, but it was only by great persuasion that I could induce the Indians to allow me to take their portraits. They had some undefined superstitious dread of losing something by the process, as though in taking their likeness something pertaining to themselves was carried off. The women, moreover, had the idea that the possessor of their picture would hold an unlimited influence over them. In one case I had taken the likeness of a woman at the Cowlitz river, and on my return about three months afterwards, I called at the lodge of Kisscox, the chief of the tribe, where I had been in the habit of visiting frequently, and had always been received with great kindness, but on this occasion I found him and his family unusually distant in their manner, and the children even running away from me and hiding; at last he asked me if I had not taken the likeness of a woman when last amongst them, I said I had, and mentioned her name, "Cawitchum," a dead silence ensued, nor could I get the slightest answer to my enquiries. Upon leaving the lodge I met a half-breed, who told me that Cawitchum was dead, and that I was supposed to be the cause of her death. The silence was occasioned by my having mentioned a dead person's name, which is considered disrespectful to the deceased, and unlucky. I immediately left the neighbourhood, well knowing the danger that would result from my meeting with any of her relations.

Upon trying to persuade another Indian to sit for his likeness he asked me repeatedly if it would not endanger his life; being very much in want of tobacco he at length appeared convinced by my assurances that it could do him no harm, but when the picture was finished he held up the tobacco and said it was a small piece to risk his life for. I asked another Indian

while he was sitting in his lodge surrounded by his eight wives, for the same favor, but the ladies all commenced violently jabbering at me until I was glad to get off: he apparently was much gratified at the interest which his wives took in his welfare. I however met him alone some short time afterwards and got him to consent, with my usual bribe, a piece of tobacco. I could relate numerous instances of this superstitious dread of portrait painting, but the foregoing will sufficiently illustrate the general feeling on the subject.

I shall conclude this paper by relating a legend told me by an old Indian while paddling in a canoe past an isolated rock on the shore of the Pacific, as it will give an idea of the general character of the legends on the coast, which are however very few, and generally told in a very unconnected and confused manner. The rock with which the following Indian legend is associated, rises to a height of between six and seven feet above the water, and measures little more than four feet in circumference. I could not observe any very special peculiarity in the formation of this rock while paddling past it in a canoe; and, at least from the points of observation presented to my eye, no resemblance to the human figure,—such as the conclusion of the legend might lead us to anticipate,—appeared to be traceable. Standing, however, as this rock does, entirely isolated, and without any other being visible for miles around, it has naturally become an object of special note to the Indians, and is not uncalculated, from its solitary position to be made the scene of some of the fanciful creations of their superstitious credulity. 'It is many moons since a Nasquawley family lived near this spot. It consisted of a widow with four sons; one of them was by her first husband the other three by her second, the three younger sons treated their elder brother with great unkindness, refusing him any share of the produce of their hunting and fishing; he, on the contrary, wishing to conciliate them, always gave them a share of his spoils. He in fact was a great medicine man, although this was unknown to them, and being tired of their harsh treatment, which no kindness on his part seemed to soften, he at length resolved to retaliate. He accordingly one day entered the lodge where they were feasting and told them that there was a large seal a short distance off. They instantly seized their spears and started in the direction he pointed out, and coming up to the animal the eldest drove his spear into it. This seal was "a great medicine," a familiar of the elder brother who had himself created him for the occasion; the foremost of them had no sooner driven in his spear than he found it impossible to disengage his hand from the handle or to draw it out; the two others drove in their spears and with the like effect. The seal now took to the water, dragging them after it, and swam far out to sea; having travelled on for many miles they saw an island in the distance, towards which the seal made, on nearing the shore they found that they could, for the first time, remove their hands from their spears; they accordingly landed, and supposing themselves in some enemies country, they hid themselves in a clump of bushes from observation; while lying concealed they saw a diminutive canoe coming round a point in the distance, paddled by a very little man, who, when he came opposite to where they were, anchored his boat with a stone attached to a long line, without perceiving them. He now sprang over the side, and diving down, remained a long time under water, at length he rose to the surface and brought with him a large fish, which he threw into the boat; this he repeated several times, each time looking in to count the fish he had caught. The three brothers being very hungry, one of them offered to swim out while the little man was under water and steal one of the fish; this he safely accomplished before the return of the fisherman, but the little fellow no sooner returned with another fish than he discovered that one of those already caught was missing, and stretching out his hand he passed it slowly along the horizon, until it pointed directly to their place of concealment. He now drew up his anchor and paddled to the shore, and immediately discovered the three brothers; and being as miraculously strong as he was diminutive, he tied their hands and feet together and throwing them into his canoe, jumped in and paddled back in the direction from whence he had come. Having rounded the distant point where they had first descried him, they came to a village inhabited by a race of people as small as their captor, their houses, boats and utensils being all in proportion to themselves. The three brothers were taken out and thrown bound as they were into a lodge, while a council was convened to decide upon their fate. During the sitting of the council an immense flock of birds resembling geese, but much larger, pounced down upon the inhabitants and commenced a violent attack. These birds had the power of throwing their sharp quills like the porcupine, and though the little warriors fought with great valour they soon became covered with the piercing darts, and all sunk insensible on the ground; when all resistance had ceased the birds took to flight and disappeared. The three brothers had witnessed the conflict from their place of confinement, and with much labour had succeeded in releasing themselves from their bonds, when they went to the battle ground and commenced pulling the quills from the apparently lifeless bodies, but no sooner had they done this than all instantly returned to consciousness. When all of them had become well again they wished to express their gratitude to their preservers and they offered to grant whatsoever they should desire; the three brothers therefore requested to be sent back to their own country. A council was accordingly called to decide on the easiest mode of doing so, and they eventually determined upon employing a whale for the purpose. The three brothers were then seated on the back of the monster and proceeded in the direction of Nasquawley; however, when they had reached about half way the whale began to think what a fool he was for carrying them instead of turning them into porpoises and letting them swim home themselves. Now the whale is considered as a "Soch-a-li" or Great Spirit,—although not the same as the "Hias Ti-yah," possessing greater powers than all other animals put together, and no sooner had he thought upon the matter than he carried it into effect. This accordingly is the way that the porpoises first came into existence, and accounts for their being constantly at war with the seals, one of which species was the cause of their first misfortunes. After the three brothers had so strangely disappeared their mother came down to the beach and remained there for days watching for their return and bewailing their absence with tears. Whilst thus engaged one day the whale happened to pass by, and taking pity on her distress he turned her into that stone.'

Food and its Adulterations.*

The world at large has almost forgotten Accum's celebrated work 'Death in the Pot;' a new generation has indeed sprung up since it was written, and fraudulent tradesmen and manufacturers have gone on in silence, and, up to this time, in security, falsifying the food and picking the pockets of the people. Startling indeed as were the revelations in that

* Abridged from the *London Quarterly*, April, 1855.

remarkable book, yet it had little effect in reforming the abuses it exposed. General denunciations of grocers did not touch individuals of the craft, and they were consequently not driven to improve the quality of their wares. The *Lancet* Commission went to work in a different manner. In Turkey, when of old they caught a baker giving false weight or adulterating *the staff of life*, they nailed his ear to the doorpost, 'pour encourager les autres.' Dr. Hassall, like a modern Al Rachid, perambulated the town himself, or sent his trustworthy agents to purchase articles, upon all of which the inexorable microscope was set to work, and every fraudulent sample, after due notice given, subjected its vendor to be pinned for ever to the terrible pages of the Commissioners' report. In this manner direct responsibility was obtained. If the falsification denounced was not the work of the retailer, he was glad enough to shift the blame upon the manufacturer, and thus the truth came out.

A gun suddenly fired into a rookery could not cause a greater commotion than this publication of the names of dishonest tradesmen, nor does the daylight, when you lift a stone, startle ugly and loathsome things more quickly than the pencil of light, streaming through a quarter-inch lens, surprised in their naked ugliness the thousand and one illegal substances which enter more or less into every description of food that it will pay to adulterate. Nay, to such a pitch of refinement has the art of falsification of alimentary substances reached, that the very articles used to adulterate are adulterated; and while one tradesman is picking the pockets of his customers, a still more cunning rogue is, unknown to himself, deep in his own!

The manner in which food is adulterated is not only one of degree but of kind. The most simple of all sophistications, and that which is most harmless, is the mixture of inferior qualities of the same substance. Indeed, if the price charged were according to quality, it would be no fraud at all, but this adjustment rarely takes place. Secondly, the mixture of cheaper articles of another kind; Thirdly, the surreptitious introduction of materials which, taken in large quantities, are prejudicial to health; and Fourthly, the admixture of the most deadly poisons in order to improve the appearance of the article 'doctored.'

The microscope alone is capable of detecting at one operation the nature and extent of the more harmless but general of these frauds. When once the investigator, by aid of that instrument, has become familiar with the configurations of different kinds of the same chemically composed substances, he is armed with far greater detective power than chemical agents could provide him with. It is beyond the limit of the test-tube to show the mind the various forms of animal and vegetable life which exist in impure water; delicate as are its powers it could not indicate the presence of the sugar insect, or distinguish with unerring nicety an admixture of the common Circuma arrowroot with the finer Maranta. Chemistry is quite capable of telling the component parts of any article: what are the definite forms and natures of the various ingredients which enter into a mixture it cannot so easily answer. This the microscope can at once effect, and in its present application consists Dr. Hassall's advantage over all previous investigators in the same field. The precision with which he is enabled to state the result of his labors leaves no appeal; he shows his reader the intimate structures of a coffee-grain and of oak or mahogany sawdust; and then a specimen of the two combined, sold under the title of genuine Mocha. Many manufacturers and retailers, who have been detected falsifying the food of the public, have threatened actions, but they all flinched from the test of the unerring instrument.

THE CRUET-STAND.

The system of adulteration is so wide-spread and embraces so many of the items of the daily meal, that we scarcely know where to begin—what corner of the veil first to lift. Let us hold up the cruet-frame, for example, and analyse its contents. There is mustard, *pepper (black and cayenne)*, *vinegar*, anchovy and Harvey sauce—so thinks the unsuspecting reader—let us show him what else beside. To begin with mustard. 'Best Durham,' or 'Superfine Durham,' no doubt it was purchased for, but we will summarily dismiss this substance by stating that it is impossible to procure it pure at all; out of forty-two samples bought by Dr. Hassall at the best as well as inferior shops, all were more or less adulterated with wheaten flour for bulk, and with turmeric for colour. Vinegar also suffers a double adulteration; it is first watered, and then pungency is given to it by the addition of sulphuric acid. A small quantity of this acid is allowed by law; and this is frequently trebled by the victualers. The pepper-caster is another stronghold of fraud—fraud so long and openly practised, that we question if the great mass of the perpetrators even think they are doing wrong. Among the milder forms of sophistication to which this article is subjected are to be found such ingredients as wheaten flour, ground rice, ground mustard-seeds, and linseed-meal. The grocer maintains a certain reserve as to the generality of the articles he employs in vitiating his wares, but pepper he seems to think is given up to him by the public to 'cook' in any manner he thinks fit. This he almost invariably does by the addition of what is known in the trade as P. D., or pepper-dust, alias the sweeping from the pepper-warehouse. But there is a lower depth still; P. D. is too genuine a commodity for some markets, and it is accordingly mixed with D. P. D., or dirt of pepper-dust.

Out of twenty-eight samples of cayenne pepper submitted to examination, no less than twenty-four were adulterated with white mustard-seed, brickdust, salt, ground rice, and *deal sawdust*, by way of giving bulk; but as all of these tend to lighten the colour, it is necessary to heighten it to the required pitch. And what is employed to do this? Hear and tremble, old Indians, and lovers of high-seasoned food—with RED LEAD. Out of twenty-eight samples, red lead, and *often in poisonous quantities*, was present in thirteen! Who knows how many 'yellow admirals' at Bath have fallen victims to their cayenne-cruets? Nor can it be said that the small quantity taken at a time could do no permanent mischief, for lead belongs to the class of poisons which are cumulative in their effects.

He who loves cayenne, as a rule is fond of curry-powder, and here also the poisonous oxide is to be found in large quantities. Some years ago a certain amiable duke recommended the laboring population, during a season of famine, to take a pinch of this condiment every morning before going to work, as "warm and comforting to the stomach.' If they had followed his advice, thirteen out of every twenty-eight persons would have imbibed a slow poison. Those who are in the habit of using curry, generally take it in considerable quantities, and thus the villanous falsification plays a more deadly part than even in cayenne pepper. Imagine a man for years pertinaciously painting his stomach with red lead! We do not know whether medical statistics prove that paralysis prevails much among 'Nabobs,' but of this we may be sure that there could be no more fruitful source of it than the two favorite stimulants we have named.

MEAT AND BREAD.

Some years ago 'the Goldner canister business' so excited the public against this invaluable method of storing perishing

articles of food, that a prejudice has existed against it ever since—and a more senseless prejudice could not be. Goldner's process, since adopted by Messrs. Cooper & Aves, is simple and beautiful. The provisions, being placed in tin canisters having their covers soldered down, are plunged up to their necks in a bath of chloride of calcium (*a preparation which imbibes* great heat without boiling), and their contents are speedily cooked; at the same time, all the air in the meat, and some of the water, are expelled in the form of steam, which issues from a pin-hole in the lid. The instant the cook ascertains the process to be complete, he drops a plug of solder upon the whole, and the mess is thus hermetically sealed. Exclusion of air, and coagulation of the albumen, are the two conditions, which enable us to hand the most delicate flavoured meats down to remote generations,—for as long, in fact, as a stout painted tin canister can maintain itself intact against the oxidating effect of the atmosphere. We have ourselves partaken lately of a duck that was winged, and of milk that came from the cow as long as eight years ago. Fruit which had been gathered whilst the free trade struggle was still going on, we found as delicate in flavour as though it had just been plucked from the branch. Out of the many cases of all kinds of provisions opened and examined by Dr. Hassall, scarcely any have been found to be bad. In the preserved meats, which are made up with potatoes and other vegetables, the needful potass exists, and such food may be forwarded to the Crimea as cheaply as the pernicious salt junk which is patronised by the Government.

When we see a loaf marked under the market-price, we may rest assured that it is made from flour ground from inferior and damaged wheat. In order to bring this up to the required colour, and destroy the sour taste which often belongs to it, bakers are in the habit of introducing a mixture called in the trade 'hards' and 'stuff,' which is nothing more than alum and salt kept prepared in large quantities by the druggists. The quantity of alum necessary to render bread white is certainly not great—Mitchell found that it ranged from 116 grains to 344 grains in the four-pound loaf—but the great advantage the baker derives from it, in addition to improving the colour of his wares, is, that it absorbes a large quantity of water, which he sells at the present time at the rate of 2*d.* per pound. Out of twenty-eight loaves of bread bought in every quarter of the metropolis, Dr. Hassall did not find one free from the adulteration of alum, and in some of the samples he found considerable quantities. As a general rule, the lower the neighbourhood, the cheaper the bread, and the greater the quantity of these 'hards' or 'stuff' introduced.

TEA AND COFFEE.

Our succeeding remarks will fall, we fear, like a bomb upon many a tea-table, and stagger teetotalism in its stronghold. A drunkard's stomach is sometimes exhibited at total-abstinence lectures, in every stage of congestion and inflammation, painted up to match the fervid eloquence of the lecturer. If tea is our only refuge from the frightful maladies entailed upon us by fermented liquors, we fear the British public is in a perplexing dilemma. Ladies, there is death in the teapot! Green-tea drinkers, beware! There has always been a vague idea afloat in the public mind about hot copper plates—a suspicion that gunpowder and hyson do not come by their colour honestly. The old Duchess of Marlborough used to boast that she came into the world before 'nerves was in fashion.' We feel half inclined to believe this joke had a great truth in it; for since the introduction of tea, nervous complaints of all kinds have greatly increased; and we need not look far to find one at least of the causes in the teapot. There is no such a thing as pure green tea to be met with in England. It is adulterated in China; and we have lately learnt to adulterate it at home almost as well as the cunning Asiatic. The pure green tea made from the most delicate green leaves grown upon *manured* soil, such as the Chinese use themselves, is, it is true, wholly untainted; and we are informed that its beautiful bluish bloom like that upon a grape, is given by the third process of roasting which it undergoes. The enormous demand for a moderately-priced green tea which has arisen both in England and China since the opening of the trade, has led the Hong merchants to imitate this peculiar colour; and this they do so successfully as to deceive the ordinary judges of the article. Black tea is openly coloured in the neighbourhood of Canton, in the most wholesale manner.

Mr. Robert Fortune, in his very interesting work, 'The Tea Districts of China and India,' gives us a good description of the manner in which this colouring process is performed, as witnessed by himself.

'Having procured a portion of Prussian-blue, he threw it into a porcelain bowel, not unlike a chemist's mortar, and crushed it into a very fine powder. At the same time a quantity of gypsum was produced and burned in the charcoal fires which were then roasting the teas. The object of this was to soften it, in order that it might be readily pounded into a very fine powder, in the same manner as the Prussian-blue had been. The gypsum, having been taken out of the fire after a certain time had elapsed, readily crumbled down, and was reduced to powder in the mortar. These two substances, having been thus prepared, were then mixed together in the proportion of four parts of gypsum to three parts of Prussian-blue, and formed a light blue powder, which was then ready for use.

'This colouring matter was applied to the teas during the process of roasting. About five minutes before the tea was removed from the pans—the time being regulated by the burning of a joss-stick—the superintendent took a small porcelain spoon, and with it he scattered a portion of the coloring matter over the leaves in each pan. The workmen then turned the leaves round rapidly with both hands, in order that the colour might be equally diffused. During this part of the operation the hands of the workmen were quite blue. I could not help thinking if any green-tea drinkers had been present during the operation their taste would have been corrected and I believe improved.

'One day an English gentleman in Shanghae, being in conversation with some Chinese from the green-tea country, asked them what reason they had for dying the tea, and whether it would not be better without undergoing this process. They acknowledged that tea was much better when prepared without having any such ingredients mixed with it, and that *they never drank dyed teas* themselves, but justly remarked, that, as foreigners seemed *to prefer having a mixture of Prussian-blue and gypsum with their tea* to make it look uniform and pretty, and as these ingredients were cheap enough, the Chinese had no objection to supply them, especially as such teas always fetched a higher price.

'I took some trouble to ascertain precisely the quantity of colouring matter used in the process of dyeing green teas, not certainly with the view of assisting others, either at home or abroad, in the art of colouring, but simply to show green-tea drinkers in England, and more particularly in the United States of America, what *quantity* of Prussian-blue and gypsum they

imbibe in the course of one year. To 14½ lbs. were applied 8 mace 2½ caudereens of colouring matter, or rather more than an ounce. To every hundred pounds of coloured green tea consumed in England or America, the consumer actually drinks more than half a pound of Prussian-blue and gypsum. And yet, tell the drinkers of this coloured tea that the Chinese eat cats and dogs, and they will hold up their hands in amazement and pity the poor Celestials.'

If the Chinese use it in these quantities to tinge the genuine leaf, how much more must the English employ in making up afresh exhausted leaves! That every spoonful of hyson or gunpowder contains a considerable quantity of this deleterious dye will be seen by any one who places a pinch upon a fine sieve, and pours upon it a gentle stream of water, when the tinging of the liquid will show at once the extent of the adulteration, and the folly of drinking painted tea. Assam tea, though not so inviting in colour, is free from adulteration. A word to the wise is enough.

Of fifty samples of green tea analysed by Dr. Hassall, all were adulterated. There is one particular kind which is almost entirely a manufactured article—gunpowder, both black and green—the former being called scented caper. Both have a large admixture of what is termed 'lye tea,' or a compound of sand, dirt, tea-dust, and broken-down portions of other leaves worked together with gum into small nodules. This detestable compound, which, according to Mr. Warrington,* who has analysed it, contains forty-five per cent. of earthly matter, is manufactured both in China and in England, for the express purpose of adulterating tea. When mixed with 'scented caper' it is 'faced' with black lead; when with gunpowder, Prussian-blue; turmeric and French chalk give it the required bloom. Mr. Warrington states that about 750,000 lbs. of this spurious tea have been imported into Great Britain within eighteen months! Singularly enough the low-priced teas are the only genuine ones. Every sample of this class which was analysed by Dr. Hassall proved to be perfectly pure. Here at least the poor have the advantage of the better classes, who pay a higher price to be injured in their health by a painted beverage.

The practice of redrying used-up leaves is also carried on to some extend in England. Mr. George Philips of the Inland Revenue Office, states that in 1843 there were no less than eight manufactories for the purpose of redrying tea-leaves in London alone, whilst there were many others in different parts of the country. These manufacturers had agents who bought up the used leaves from hotels, clubs, coffeehouses, &c., for twopence-half-penny and threepence per lb. With these leaves, dhers of various trees were used, and very fine pekoe still flourishes upon the hawthorn-bushes, sloe-trees, &c., around the metropolis. As late as the year 1851 the following account of the proceedings of one of these nefarious manufacturers appeared in *The Times*:—

If the better class of black and green teas† are thus vilely adulterated, the reader may fancy that he can at least take refuge in coffee—alas! in too many cases he will only avoid Scylla to fall into Charybdis. Coffee, as generally sold in the metropolis and in all large towns, is adulterated more than tea. The Treasury Minute, which allowed it to be mixed with chicory, is at the head and front of the offending. In the year 1840 this celebrated Minute was issued by the sanction of the then Chancellor of Exchequer, Sir C. Wood, the immediate consequence of which was that grocers began to mix it with pure coffee in very large quantities, quite forgetting to inform the public of the nature of the mixture, and neglecting at the same time to lower the price. The evil became so flagrant that upon the installation of the Derby administration, Mr. Disraeli promised to rescind this license to adulterate; but before the promise was redeemed, the administration was rescinded itself. Mr. Gladstone, upon his acceptance of office, loath, it appears, to injure the chicory interest, modified the original Minute, but allowed the amalgamation to continue, provided the package was labelled 'Mixture of Chicory and Coffee.' It was speedily found, however, that this announcement became so confounded with other printing on the label that it was not easily distinguishable, and in consequence it was provided that the words, 'This is sold as a mixture of Chicory and Coffee,' should be printed by themselves on one side of the canister. It may be asked what is the nature of this ingredient, that the right to mix it with coffee should be maintained by two Chancellors of the Exchequer during a period of fifteen years as jealously as though it were some important principle of our constitution? Chicory, to say the best of it, is an insipid root, totally destitute of any nourishing or refreshing quality, being utterly deficient in any nitrogenized principle, whilst there are strong doubts whether it is not absolutely hurtful to the nervous system. Professor Beer, the celebrated oculist of Vienna, forbids the use of it to his patients, considering it to be the cause of amaurotic blindness. Even supposing it to be perfectly harmless, we have a material of the value of 8*d.* a pound, which the grocer is allowed to mix *ad libitum* with one worth 1*s.* 4*d.* If the poor got the benefit of the adulteration, there might be some excuse for permitting the admixture of chicory, but it is proved the combination is sold in many shops at the same price as pure coffee. Analyses made by Dr. Hassall of upwards of a hundred different samples of coffee, purchased in all parts of the metropolis before the issuing of the order for the labelling of the packages 'chicory and coffee,' proved that, in a great number of cases, articles sold as 'finest Mocha,' 'choice Jamaica coffee,' 'superb coffee,' &c., contained, in some cases, very little coffee at all; in others 'only a fifth, a third, half,' &c., the rest being made up mainly of chicory.

THE SUGAR-BASIN.

We are afraid, if we look into the sugar-basin, we shall not find much more comfort than in the milk-jug. We refer here to the ordinary brown sugars, such as are generally used at the breakfast-table for coffee. It is scarcely possible to procure moist sugar which is not infested with animalcula of the acari genus, a most disgusting class of creatures. In many samples of sugars they swarm to that extent that the mass moves with them; and in almost every case, by dissolving a spoonful in a wine-glass of water, dozens of them can be detected by the naked eye, either floating upon the liquid or adhering to the edge of the glass. Those who are in the habit of 'handling' sugars, as it is termed, are liable to a skin affection called the grocer's itch, which is believed to be occasioned by these living inhabitants of our sugar-basins. Horrible as it is to think that such creatures are an article in daily use, we cannot charge the grocer directly with their introduction; the evil is, however, increased by the manner in which he mixes, or 'handles,' as it is termed in the trade, higher-priced sugars with muscovados, bastards, and other inferior kinds, in which the animal-

* In an article upon the teas of commerce, which appeared in the 'Quarterly Journal of the Chemical Society' for July, 1851.

† Assam tea is the only exception to this rule.

cula abound. In addition to this foreign animal element, grocers sometimes mix flour with their sugar, and, if we are to put any credit in popular belief, sand; but of the presence of this gritty ingredient we have never seen any trustworthy evidence. Nevertheless we have said enough to show that the tea-dealer and grocer do their best to supply the proverbial 'peck of dirt' which all of us must eat before we die. Would that we were fed with nothing more deleterious or repulsive! Let us see, however, the base admixtures one is liable to swallow in taking—

A Cup of Tea	*or a*	Cup of Coffee.
In the Tea.		*In the Coffee.*
If Green.		Chicory.
Prussian-blue.		*In the Chicory.*
Turmeric.		Roast wheat.
China clay or French chalk.		" acorn.
Used tea-leaves.		" mangold-wurzel.
Copperas.		" beans.
If Black.		" carrots.
Gum.		" parsnips.
Black lead.		" lupin-seeds,
Dutch pink.		" dog-biscuit.
Used tea-leaves.		" horse-chesnuts.
Leaves of the ash, sloe hawthorn, and of many other kinds.		Oxide of iron.
		Mahogany sawdust.
In the Milk.		Baked horse's liver.
		" bullock's liver.
On an average 25 per cent. of water.		*In the Milk.*
Annatto.		Water 25 per cent.
Treacle.		Annatto.
Flour.		Flour.
Oxide of iron.		Treacle.
And other unknown ingredients.		Oxide of iron.
		And other unknown ingredients.
In the Sugar.		*In the Sugar.*
If brown—		If Brown—
Wheat flour.		Wheat flour.
Hundreds of the sugar insects.		Hundreds of the sugar insect.
If White—		If White—
Albumen of bullock's blood.		Albumen of bullock's blood.

We shall not dwell upon cocoa further than to state that it is a still rarer thing to obtain it pure, than either tea or coffee. The almost universal adulterations are sugar, starch, and flour, together with red colouring matter, generally some ferruginous earth; whilst, as far as we can see, what is termed homœopathic cocoa is only distinguished from other kinds by the small quantity of that substance contained in it.

PICKLES.

Accum, in his 'Death in the Pot,' quotes, from cookery-books of reputation in his day, recipes which make uninitiated persons stare. For instance, 'Modern Cookery, or the English Housewife,' gives the following serious directions 'to make Greening:'—'Take a bit of *verdigris the bigness of a hazel-nut*, finely powdered, half a pint of distilled vinegar, and a bit of alum-powder, with a little baysalt; put all in a bottle and shake it, and let it stand till clear. *Put a small teaspoonful into codlings, or whatever you wish to green.*

Again, the 'English Housekeeper,' a book which ran through 18 editions, directs—'to make pickles green *boil them with half-pence*, or allow them to stand for twenty-four hours in copper or brass pans!' Has the notable housewife ever wondered to herself, how it is that all the pickles of the shops are of so much more inviting colour than her own?—we will satisfy her curiosity at a word—she has forgotten the 'bit of verdigris the bigness of a hazel-nut,' for it is now proved beyond doubt, that to this complexion do they come by the use of copper, introduced for the sole purpose of making them of a lively green. The analyses of twenty samples of pickles bought of the most respectable tradesmen proved, firstly, that the vinegar in the bottles owed most of its strength to the introduction of sulphuric acid; secondly, that out of sixteen different pickles analysed for the purpose, copper was detected in various amounts. Thus 'two of the samples contained a small quantity; eight rather much, one a considerable quantity, three a very considerable quantity; in one copper was present in a highly deleterious amount, and in two *in poisonous amounts*. The largest quantity of this metal was found in the bottles consisting entirely of green vegetables, such as gherkins and beans.'

We trust after this the good housewife will feel jealous no longer, but rest satisfied that the home-made article, if less inviting and vivid in colour, is at least more wholesome. A simple test to discover the presence of copper in such articles is to place a bright knitting-needle in the vinegar, and let it remain there for a few hours, when the deleterious metal will speedily form a coating over it, dense or thin, according to the amount which exists. Wherever large quantities are found, it is wilfully inserted for the purpose of producing the bright green colour, but a small quantity may find its way into the pickles in the process of boiling in the copper pans. Messrs. Crosse and Blackwell, the great pickle and preserve manufacturers in Soho, immediately they became aware, from the analyses of the *Lancet*, that such was the case, in a very praiseworthy manner substituted silver and glass at a great expense, for all their former vessels. The danger arising from the introduction of this virulent poison into our food would not be so great if it were confined to pickles, of which the quantity taken is small at each meal, but it is used to paint all kinds of preserves, and fruits for winter pies and tarts are bloomed with death. The papa who presents his children with the box of sweetmeats bedded in coloured paper, and enclosed in an elegant casket, may be corroding unawares the very springs of their existence. As a general rule it is found that the red fruits, such as currents, raspberries, and cherries, are uncontaminated with this deleterious metal, but owe their deep hue to some red colouring matter, such as a decoction of logwood, or infusion of beetroot, in the same way that common white cabbage is converted into red, by the nefarious pickle-merchant. The green fruits are not all deleterious in the same degree; there seems to be an ascending scale of virulence, much after the following manner;—Limes, gooseberries, rhubarb, green-gages, olives—the last-mentioned fruit, especially those of French preparation, generally containing verdigris, or the acetate of copper, *in highly dangerous quantities*. The *Lancet* publishes a letter from Mr. Bernays, F.C.S., dated from the Chemical Library, Derby, in which he shows the necessity of watchfulness in the purchase of these articles of food:—

'Of this,' he says, 'I will give you a late instance. I had bought a bottle of preserved gooseberries from one of the most respectable grocers in the town, and had its contents transferred to a pie. It struck me that the gooseberries looked fearfully green when cooked; and in eating one with a steel fork, its intense bitterness sent me in search for the sugar. After having sweetened and smashed the gooseberries, with the same steel fork, I was about to convey some to my mouth, when I observed the prong to be completely coated with a thin film of bright metallic copper. My testimony can be borne out by the evidence of others, two of whom dined at my table.'

It was fortunate that these three gentlemen used steel forks, which instantly disclosed the mischief: if they had chanced to use silver, all three might have fallen victims to these poisonous conserves.

But we are not yet at the worst. When Catherine de Medicis wished to get rid of obnoxious persons in an 'artistic' manner, she was in the habit of presenting them with delicately made sweetmeats, or trinkets, in which death lurked in the most engaging manner; she carried

> 'Pure death in an earring, a casket,
> A signet, a fan-mount, a filigree basket.'

Her poisoned feasts are matters of history, at which people shudder as they read; but we question if the diabolical revenge and cold-blooded wickedness of an Italian woman ever invented much more deadly trifles than our low, cheap confectioners do on the largest scale.

OF SUGAR ORNAMENT.

The painted feast contains, among its highly injurious ingredients, ferrocyanide of iron or Prussian-blue, Antwerp-blue-gamboge, and ultramarine, and among its deadly poisons the three chrome yellows, red lead, white lead, vermilion, the three Brunswick greens, and Scheele's green or arsenite of copper. The wonder is that, considering we set such poison-traps for children, ten times more enticing and quite as deadly as those used to bane rats, that the greater number of youngsters who partake of them are not at once despatched, and so undoubtedly they would be if nurses were not cautious about these coloured parts, which have always enjoyed a bad name under the general denomination of 'trash and messes.' As it is, we are informed by Dr. Letheby that 'no less than seventy cases of poisoning have been traced to this source' within three years!

In France, Belgium, and Switzerland the colouring of confectionery with poisonous pigments is prohibited, and the vendors are held responsible for all accidents which may occur to persons from eating their sugar confectionery.

All kinds of sugar-plums, comfits, and 'kisses,' in addition to being often adulterated with large quantities of plaster of Paris, are always open to the suspicion of being poisoned. Necessity cannot be urged for the continuance of this wicked practice, as there are plenty of vegetable pigments which, if not quite so vivid as the acrid mineral ones, are sufficiently so to please the eye. Of late years a peculiar lozenge has been introduced, in which the flavour of certain fruits is singularly imitated. Thus we have essence of jargonel drops, essence of pine-apple drops, and many others of a most delicate taste. They really are so delicious that we scarcely like to create a prejudice against them; but the truth is great and must prevail: all these delicate essences are made from a preparation of æther and rancid cheese and butter.

If we could possibly eliminate, from the mass of human disease, that occasioned by the constant use of deleterious food, we should find that it amounted to a very considerable percentage on the whole, and that one of the best friends of the doctor would prove to be the adulterator. But even our refuge fails us in our hour of need; the tools of the medical man, like those of the sappers and miners before Sebastopol, often turn out to be worthless. Drugs and medical comforts are perhaps adulterated as extensively as any other article. To mention only a few familiar and household medicines for instance:—Epsom salts are adulterated with sulphate of soda; carbonate of soda with sulphate of soda—a very injurious substitute. Mercury is sometimes falsified with lead, tin, and bismuth; gentian with the poisonous drugs aconite and belladonna; rhubarb with turmeric and gamboge; cantharides with black pepper; and cod-liver and castor oils with common and inferior oils; whilst opium, one of the sheet-anchors of the physician, is adulterated to the greatest extent in a dozen different ways. Medical comforts are equally uncertain. Thus potato-flour forms full half of the so-called arrow-roots of commerce; sago-meal is another very common ingredient in this nourishing substance. Out of fifty samples of so styled arrow-root, Dr. Hassall found twenty-two adulterated, many of them consisting *entirely* of potato-flour and sago-meal. One-half of the common oatmeals to be met with are adulterated with barley meal, a much less nutritious substance—an important fact, which boards of guardians should be acquainted with. Honey is sophisticated with flour-starch and sugar-starch. And lastly, we wish to say something important to mothers. Put no faith in the hundred and one preparations of farinaceous food for infants which are paraded under so many attractive titles. They are all composed of wheat-flour, potato-flour, sago, &c.,—very familiar ingredients, which would not take with anxious parents unless christened with extraordinary names, for which their compounders demand an extraordinary charge. To invalids we would also say, place no reliance on the Revalentas and Ervalentas advertised through the country as cures for all imaginary diseases. They consist almost entirely of lentil-powder, barley-flour, &c., which are charged cent. per cent. above their real value.

Of all the articles we have touched upon, not one is so important as water. It mixes more or less with all our solid food, and forms nine-tenths of all our drinks. Man himself, as a sanitary writer has observed, is in great part made up of this element, and if you were to put him under a press you would squeeze out of him 8½ pailfuls. That it should be furnished pure to the consumer is of the first importance in a sanitary and economic point of view.

The Unity of the Human Race.*

Experience has taught us not too hastily to charge any scientific theory with being contradictory to Scripture. Freedom of speculation is rightly privileged. Revealed truth is not endangered by discussion and investigation.

Hence, when a theory is proposed to us like that of the specific difference between the several races of mankind, we shall do well to receive it without anger or contempt, and to enquire whether it may not be possibly consistent with Theological and physiological science.

That the whole human race has sprung from one male and one female at the first, seems, however, to be distinctly taught in Holy Scripture, and to be a matter of the highest antecedent probability from physical considerations.

The doctrine of our oneness of origin, let it be noted, does not depend upon a single text, such as that which affirms that "God hath made of one blood all the nations of men." Though this passage, and others like it, should be explained away, that doctrine could not perish with them. For all Scripture either asserts or else assumes the unity of the human family. Adam by transgression fell; mankind in general were involved in the fall. They have an hereditary taint; their nature is corrupted, because they are his offspring. And their redemption comes

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* *Canadian Journal*, May, 1855.

by means analagous to that which brought their ruin on them. The Redeemer takes their nature, and makes them partakers of his own divine nature. "As in Adam all die, even so in Christ shall all be made alive." Hence, this strange assertion of a plurality of species among mankind seems altogether inconsistent with the revealed word. To accept it is, in all appearance at least, to lose our faith in the intelligibility, the practical utility of Scripture. The language of inspiration is surely wanting in any definite significance at all, if it can by any means be made susceptible of an interpretation in favor of the view in question. We know, indeed, the arguments which are adduced from Astronomy and from Geology, in their relation to the language of the Bible, as being applicable likewise to the matter now under consideration. But is there really any parallelism in the case? *The motion of the sun* is spoken of in the Old Testament,—a fact once urged against the truth of the Copernican system. Yet the inspired writers, when they used such language, were not teaching us astronomy; and, for the purpose merely of describing things as they appear, the expression is so natural, that knowing as we do the actual fact, we still are wont to say that *the sun has risen—has travelled upwards to the meridian—is going down towards the west.*

So, too, with respect to the theories of the Geologist. His science, also, has been thought incompatible with the Mosaic history of the creation of our world. For Scripture saith, "In six days the Lord made heaven and earth." Modern Geology declares that a creative work has been proceeding on the earth, throughout *myriads*, nay *hundreds of thousands of years!*

But then we learn to think the less of this apparent difficulty, on discovering that the word *day* has no uniform nor fixed signification in the Holy Scriptures. We are therein told, for instance, that "one day is with the Lord as a thousand years, and a thousand years as one day." Again, it is admitted, with the common consent of the interpreters of Scriptural predictions, that in the prophetical vocabulary *day* stands for *year*.

There is, therefore, as we may say, nothing in the above examples from Astronomy and Geology amounting to a contradiction of the words of Scripture, when they are fairly construed and explained. And there is, at the same time, an immense amount of evidence in their favor, as scientific truths.

That the sun is, so far at least as this earth is concerned, the fixed centre around which we circulate, has been conclusively demonstrated; so that *we must* interpret Scripture language consistently with this established fact. The results of geological research are not yet, indeed, so familiar to the unlearned many, neither are the principles of geology as yet so capable of demonstration as are the principles of Astronomy. Still, the Geologist finds certain fundamental principles in his favorite science, of the necessary truth of which he is assured upon the evidence of his own reason, and of his physical senses, and of arithmetical computation. And of such sort is his proposition concerning the vast antiquity of those organic and animal remains which he discovers in the earlier strata of the crust of the earth; insomuch that whoever takes the trouble to investigate the subject, is, in a manner, driven to adopt his conclusion.

But how stands the case, with respect to the question of one or many species in the genus BIMANA?

There is no true connection, as we have seen, between these several theories in the matter of their respective harmony or variance with Holy Scripture. Let it, now, be further affirmed, that neither is there any closer resemblance between them, when their scientific merits are compared. Zoology is certainly unfaverable, upon the whole, to this theory of a specific difference of race among mankind. Such arguments as we can derive from analogy tell strongly against it.

It is an established general fact, that the offspring of a male and female of diverse kind is barren. Particular exceptions to this rule may be on record, but the rule itself stands good. The mule we get by pairing the horse with the ass, cannot propagate its kind; neither are those hybrids of the Fringilla genus, which bird-fanciers delight in breeding, found to be prolific. But it is otherwise with human beings. The union of their various races has always been productive of a progeny perfect in every physical function, fully capable of continuing the race. Experience teaches us, in fact, that we have to fear, not the mixture of any foreign stock, but rather the continuance of intermarriages among tribes too nearly connected—*the breeding in and in.*

The strongest argument, however, of the advocates for a specific difference among men, may be, perhaps, that which they find in the great bodily variations which evidently exist. There are races of men, they argue, so opposite, not alone in color or in stature, but in more fixed and fundamental characteristics, as in the configuration of the skull, that they must necessarily be of different origin. Now this diversity is certainly strange and mysterious; and yet we see variety as marked among domestic animals, whose identity of species is unquestioned by Zoologists. In that one species of the equine genus which we call, *par excellence*, the horse, the differences of size and shape are very great. Our more familiar friend, the dog, furnishes us with examples even more remarkable of deviations from his own common type.

Among direct arguments in favor of the common origin of all men, the philologist produces one, drawn from his perception of a single source and root of all existing languages. And his reasoning seems weighty; but it must be sufficient here to make this passing allusion to the aid he has to offer us.

And, to make an end of words already too much multiplied, strange is it to find some men so restless, so dissatisfied with the natural status of their race. Melancholy, yet ludicrous, the contemplation of the opposite attempts which we have seen made to deprive that "fairest of her daughters, Eve," of her long-worn honors as "the mother of all living." Thus, there is a theory, we know, which directs us backwards to the fish, and one step lower, to find the embryo of human kind:—*turpiter atrum, desinit in piscem, mulier formosa.*

The speculation we have been considering, on the other hand, is one which so exaggerates the value of varieties of form and color, as to require distinct original progenitors for white men, for the red, and for the black.

Between such conflicting views we rather choose to hold fast by the literal meaning of the Bible, deeming ourselves and all our fellow-creatures *the offspring of God—a little lower than the angels—children of one father—every one members one of another.*

T. H. M. B.

Elementary Geology.*

The progress of a national scientific investigation, zealously and faithfully conducted, such as the Geological Survey of Canada, commands a respectful attention from the public, and encourages a spirit of active enquiry and enthusiasm among the youth of

* A Manual of Elementary Geology: or the Ancient Changes of the Earth and its Inhabitants, as illustrated by Geological Monuments. By Sir Charles Lyell, M.A., F.R.S., Fifth Edition, greatly enlarged and illustrated with 750 wood cuts. Boston: Little, Brown & Company. 1855.

the country. "Nothing is plainer to me, from my own experience," says the Rev. Andrew Bell of L'Orignal, "than the fact that there is a gradual breaking down of the prejudices which have been entertained in regard to Geology; and amongst the whole circle of my friends and acquaintances throughout the Province, I have marked a growing desire for information in regard to it."* It frequently happens that accidental circumstances favour in a remarkable manner the prosecution of of this branch of Natural Science, and the excellent vein of knowledge which Mr. Logan says seems to run up the Ottawa, may have its origin in those rich and varied fossiliferous and metamorphic rocks which compose for long distances the opposite banks of that majestic river.

The members of the 'Silurian Society' hold their meetings in the City of Ottawa, almost on the shores of a Lower Silurian Sea; in which the remains of animal and vegetable life are found to lie in inexhaustible abundance and in an exquisite state of preservation. The name of the Society is significant, and when correctly interpreted neither assuming nor pedantic. Out of twelve groups of rock recognized by Geologists, the Silurian group is the oldest but one. It underlies the City of Ottawa, and there exhibits itself in grand precipices and cliffs on the romantic banks of the river. No other fossiliferous rocks but those which belong to the Lower Silurian group, with the exception of the Post-Tertiary have been found near the city, or indeed we believe, between the Ottawa and the St. Lawrence. The object of the Silurian Society then, if we are not misled by its name, is to encourage the study of the Silurian rocks upon which the City of Ottawa is founded; of which its houses, churches, bridges and magnificent locks are built, its public edifices constructed, and its streets paved. In some parts of the huge piles of rock which rise layer upon layer to the height of nearly 200 feet, it is scarcely possible to detach a slab from its bed without revealing the beautiful and delicate forms of Crinoids, Cystydeans, Trilobites, Graptolites and Corals. Many of the fragile Stone-lilies preserve their original form and position with such minuteness, and occur in such countless numbers, as to convey the idea that one is wandering over the bottom of a secluded and tranquil bay in a remote corner of a Silurian Sea, where, undisturbed by winds or waves, the living tenants of the deep suddenly died and turned to stone.

That the 'Silurian Society' may grow in strength and wisdom, is a wish to which all may cordially respond, as well as to the conviction, that with disinterested zeal and diligence it will become the inspiring centre of useful geological investigation in that rich and almost unexplored region which occupies the banks of the Ottawa.

Second, perhaps, in the power of awakening a taste for the pursuit of Natural Science, stand those illustrious individuals who, in addition to profound acquirements, are fortunate enough to possess social and moral excellencies which win the sympathies and affections of their disciples. To what department of Natural Science can we turn and not find the name of the late Professor Edward Forbes associated with its improvement and progress. "Never perhaps," says Sir Charles Lyell in the preface to the fifth edition of his Elementary Geology, just published, "has it been the lot of any Englishman who had not attained to political or literary eminence, more especially one who had not reached his fortieth year, to engage the sympathies of so wide a circle of admirers, and to be so generally mourned. The untimely death of such a teacher was justly felt to be a national loss; for there was a deep conviction in the minds of all who knew him, that genius of so high order, combined with vast acquirements, true independence of character, and so many social and moral excellencies, would have inspired a large portion of the rising generation with kindred enthusiasm for branches of knowledge hitherto neglected in the education of British youth."

Not less influential, though in a narrower sphere than the distinguished professional teacher, with the civilized world as his auditors or readers, stands the enthusiastic amateur student of nature, who pursues with retired and unassuming zeal the investigations which belong to his favourite science. Every country in one form or another has its own Hugh Miller. The force of genius joined with true excellence of character occasionally succeed in elevating everywhere some one to an exalted position in the social scale. "Mr. Telford, like Mr. Miller, followed the profession of a stone-mason before his industry and self-tuition qualified him for the higher functions of an architect and civil engineer; and Mr. Watt and Mr. Rennie rose to wealth and fame without the aid of a university education. But distinguished as these individuals were, none of them possessed those qualities of mind which Mr. Miller has exhibited in his writings; and, with the exception of Burns, the uneducated genius which has done honour to Scotland during the last century has never displayed that mental refinement, and classical taste, and intellectual energy, which mark all the writings of Hugh Miller."*

We do not require to search long or wide for a Canadian Hugh Miller; one not known to the public by his writings or published discoveries, but rather by a most honourable mention in the report of the Director of the Canadian Geological Survey; by a unique collection of palæontological monuments of Silurian age; by unsurpassed mineralogical proofs of the hidden wealth of the Ottawa valley; by a patient and laborious study of Canadian rocks when a Geological Survey of the country was hardly thought of, and by the fact that many of these investigations were carried on, and fossil and mineral treasures discovered and hoarded up, during years of wild and romantic life in the uninhabited parts of Canada and the trackless regions of the Hudson's Bay Company's Territory; trusting to his rod and his gun for the support of life, and, like Hugh Miller, exchanging all day-dreams and amusements for the kind of life in which men "toil every day that they may be enabled to eat, and eat every day that they may be enabled to toil." With the early progress and development of the Geology of Canada, the name of Andrew Dickson will always be honorably associated.

At the present time public attention abroad is especially directed to this country through the remarkable display at the Paris Exhibition of our mineral wealth. The future of Canada is likely to be influenced in a great degree by the encouragement which is given to mining industry, and the care and economy with which all such enterprise is conducted. Perhaps there is no science which can engage the attention of the youth of Canada, with such excellent prospects of utilitarian advantage, as that of Geology. "It is a philosophy which never rests—its law is progress: a point which yesterday was invisible, is its goal to-day, and will be its starting post to-morrow." These considerations induce us to recommend to

* See the Evidence of Mr. Bell before the Select Committee on the Geological Survey of Canada.

* See a sketch of the Life and Writings of Hugh Miller, by Sir David Brewster, in "The Footprints of the Creator."

the careful attention of those who are desirous of making this branch of science a recreative study, the last edition (5th) of Sir Charles Lyell's Elementary Geology, a work which is, unquestionably, the most faithful exposition of the present condition of Geological Science now in print.

Coccothraustes Vespertina.—Evening Grosbeak.

BY THOMAS COTTLE, ESQ.

A notice of the appearance of the *Coccothraustes Vespertina* within the peninsular of Western Canada,—of which Bonaparte says, "few birds could form a more interesting acquisition to the Fauna of any country than this really fine Grosbeak,"—is, I think, of sufficient interest to the Ornithologist to merit a place in *the Canadian Journal*: and would the various observers of nature in different parts of this Province note in the same paper any varieties they may discover, either in the animal or vegetable kingdoms, it would greatly aid the enquiries into its Fauna and Flora.

This bird was little known when the Prince of Musignano wrote his supplement to Wilson's American Ornithology. He says, "The specimen of the Evening Grosbeak presented to the Lyceum of New York by Mr. Schoolcraft, (1823), from which Mr. Cooper established the species, was thought, until lately, to be the only one in the possession of civilized man; but we have since examined two shot early in the spring on the Athabasca Lake, near the Rocky Mountains, and preserved among the endless treasures of Mr. Leadbeater of London." His description of the male is very correct, except that in the four specimens I have examined, there was no white at all on any of the tail feathers or on the quills, the three outer of which he describes as being "inconspicuously tipped with whitish." This might be the difference of age or the incomplete change from winter to summer plumage. The bill he also describes as greenish yellow brighter on the margins, this is the appearance in the dry state and detracts somewhat from the beauty of the head, for when alive it is wholly of an apple green. He also makes a great error in stating:—"No difference of any consequence is observable between the sexes, though it might be said the female is a little less in size and duller in plumage." He evidently had not seen a female, and probably one of Leadbeater's birds, from which he says he took his description, may have been a young male. The sexes differ as much as would naturally be expected in a bird of such bright colours, as will be evident by a glance at the two specimens accompanying this paper. I dissected four birds in the yellow plumage and found them all males, and three in the ash-coloured and found them all females, so there can be no doubt of the plumage of the sexes. Dr. Richardson gives a plate of this bird in his Northern Zoology, which is rather over-coloured.

I first discovered the Evening Grosbeak in a maple wood on the 7th of May, they were very numerous, the flock amounting to at least fifty. The day was very cold for the time of year, and in the evening it began to snow, which lay on the ground during the night; this day and the following they frequented the same wood, since which I have not seen them. They were by no means shy, but on being fired at would fly a short distance and alight again, continually uttering a short monotonous note. Those I killed were excessively fat, their craws and stomachs were distended with the seeds of the maple denuded of the husk.

Description of the Female.—Bill as in the male; irides black; head ash-colour, an indistinct yellowish band passes from the shoulders round the hind part of the head; back, ash, not quite as dark as the head, and with a slight yellowish hue; chin white, bordered by a black line from the angles of the lower bill; belly, pale ash; lesser wing coverts black with the exception of three or four nearest the back, the outer webs of which are white, the under ones yellow; the outer feathers of the greater wing coverts white, the centre and tip broadly black, those nearer the back black, at base and inner web, but the upper half dark ash; the three first quills black, slightly marked with white on the inside, the next four barred with white, the inner webs edged with white; tail coverts black tipped with white; tail feathers black, a large white space on the inner web at the end. A yellowish tinge pervades all those parts of the plumage that are yellow in the male.

Woodstock, June, 1855.

Lubrication—Mineral Oil as a Lubricant for Machinery.

It will be permitted by every one experienced in the working of extensive steam or other machinery, that to obtain a good lubricating material, possessing all the qualities which will render it fit for general useful application, and, above all, a certain degree of cheapness, is a question of considerable difficulty, and often, indeed, one which the practical engineer and machinist finds quite beyond his means of solution. There can be no doubt that certain of the lubricants at present in use possess a character which, considered in respect to especial applications, places them almost out of the the reach of any ordinary substitute; but it must be remembered that these very specialities render such substances unsuitable to general purposes; and it cannot be denied, that any material which is in itself capable of such modifications in process of manufacture as will render it equally suitable to the lubrication of a steam-engine or of the spindles of a cotton-mill, to machinery working with either a high or low degree of speed, is a desideratum in every branch of industry in which mechanical agency is employed. Such qualities as these are claimed for the *mineral oil*, the chemical and physical properties of which we propose to bring under brief review.

When we examine into the question of what the peculiar properties are which it is necessary that a good lubricant should possess, we find the subject dividing itself into two parts—the one relating to the chemical constitution of the lubricating agent, the other to its physical character. With regard to its chemical composition and behaviour, the considerations that present themselves relate, first, to the action of the elements of the lubricating matter, directly or indirectly, upon the metal of which the machine is constructed; and, secondly, to the changes which it may experience in its own constitution by exposure to air or any other influence, as any change in its chemical character produced under such circumstances would, in all probability, immediately affect the question of its lubricating power. Perhaps, in nine-tenths of the cases in which a lubricating medium is employed, at least when the lubricant is in the fluid or semi-fluid state, all the parts of the machinery are composed of metal, either iron, or some form of brass or gun-metal. From this circumstance, it must be at once obvious that the chemical habitudes of the lubricating material towards these metals is a consideration of importance, particularly when the machinery is of a delicate character. It is a very well-known fact, even to those who possess no knowledge of chemical principles or reactions, that when such metals as those named above are exposed to the continued influence of the air, especially if moisture be present, their surface undergoes a peculiar change from the action of the oxygen contained in the atmosphere, with which substance most of the metals can unite, their surface becoming abraded or destroyed as the action progresses. This is termed oxidation.

The power of oxygen to combine with metallic surfaces is very greatly enhanced by the presence of many chemical substances which possess an affinity for the oxide first formed; in that case the production of the oxide will be constantly renewed, and the wear or waste of the metal will be commensurate with the rapidity with which this chemical operation goes on. If, then, a substance possessed in the highest and most perfect degree the physical characters requisite in a lubricating material, but were at the same time capable of acting in

the manner just described upon the metal itself, it is manifest that it could not be advantageously employed as a lubricant.

Many of the oils and fats which are employed in greasing machinery undergo spontaneously a chemical change which endues them with the power of oxidising metals, particularly copper, and consequently brass, which is an alloy of that metal. Some fatty substances run more quickly into this condition than others, and the change, when it has proceeded far is sufficiently marked to be at once recognisible on a very cursory examination of the material. This change is popularly known as rancidity: it consists in the spontaneous conversion of the elements of the fatty substance into acids, which differ according to the nature of the material itself, but which have in all cases sufficient affinity for metallic bodies to establish that action upon the surface to which we have already alluded. In some instances the mere contact of the fatty body with a metal is sufficient to effect a change in it which enables it to react secondarily upon the metal itself. An action of this kind may be seen when a bright piece of lead is kept immersed for some time in a vegetable oil, particularly olive oil: the whole surface of the lead in this case will soon be covered with a thin deposit of an unctuous substance, called by chemists margarate of lead; the first action of the lead being to promote the conversion of the margarine contained in the oil into margaric acid, which then reacting upon the lead, produces the substance described. With respect to the chemical changes of the second kind in which the lubricant may be involved, the circumstances are different. There the lubricant may be totally inactive, so far as in its relation to the metal of the machinery is concerned; but, by exposure to air, or from some other influence, it may have been so far chemically changed as to have become thickened or rendered viscid and adhesive, or it might have acquired the property of drying up after a while into a hard, resinous kind of matter: all these changes would, of course, unfit any material for the purposes of lubrication. A certain class of oleaginous bodies have naturally the property of drying when exposed to the air, and many of those which have not naturally this character are rendered thick and tenacious under the combined influence of air and a raised temperature None of the various materials which are obnoxious to such changes can be placed in the category of the substances suitable to the uses of the practical engineer, except in the very roughest kind of machinery; and even then their employment is equivalent to a certain loss of power in the prime moving force.

From what has now been said, it appears, then, that a perfectly good lubricant should combine these definite chemical and physical qualities:—first, it must be incapable of exercising any chemical action upon the metal exposed to its influence; secondly, it must maintain the integrity of its normal chemical constitution under the influence of heat and atmospheric air: and, thirdly, it must, for fine machinery, possess sufficient unctuosity to enable it to interpose a homogenous medium between the metallic surfaces without flying off, during the rapid motion of any part of the work; while, for heavy machinery, it must, in addition to its freedom from all liability to chemical change, possess that degree of consistency and tenacity which would prevent it from being easily forced out from between moving surfaces by pressure alone. There are few substances which combine these qualities; perhaps those in which they are most conspicious are sperm oil and the olein of solid fats: the former may be taken as a standard by which we may judge of the lubricating power of all other fatty materials. Having now, then, in some degree ascertained the points in which the value of a good lubricant consists, we will inquire how far the *mineral oil* can establish its claim to that title.

Some years ago, it was discovered that when the bituminous shales, or schists—which abound in many localities in Europe—are exposed to destructive distillation, they yield a very considerable quantity of a tarry liquid, which, upon re-distillation, furnishes a volatile spirituous fluid resembling coal naptha, and an abundance of oils, boiling at varying but very high temperatures. At a later period it was found that peat would yield, under similar treatment, oils of a very similar character: and, still later, a further source of these oils, in unlimited quantity, has been discovered in the variety of coal, or more properly shale, which has come into extensive use in gas-making under the name of "Boghead coal." The peculiar character of these oils consists in their containing a large quantity of the substance called *paraffine*, which is held in solution by a thin oil of low specific gravity, closely resembling, if not identical with, the oil first described by the Continental chemist Reichenbach under the name of Eupion: this oil, from its containing paraffine, is sometimes called, commercially, "paraffine oil." In distilling the Boghead coal with the object of obtaining the oil, particular regard must be had to the temperature at which the distillation is carried on; for it is a remarkable fact, that the nature of these pyrogenous products varies in an extraordinary manner according to the temperature employed in producing them. In order to obtain the maximum quantity of paraffine oil from the Boghead coal, the heat should not exceed, at any period of the distillation, a dull red, and the process should commence with the lowest temperature at which the tar will distil over. This point being properly attended to, the least quantity of gas and the largest quantity of oil will be obtained: whereas if the temperature rise to a cherry or bright red, the contrary will be the case, as a considerable portion of the oil will be then converted into gas; and not only so, but in the place of paraffine, which is eminently the product of a low temperature a different substance, naphthaline, will be formed, and will, like the paraffine, be held in solution in the fluid oil. In re-distilling the tar to obtain the paraffine oil, the nature of the product varies as the process proceeds: first comes over the thin eupion-like oil, which boils at the lowest temperature: then comes, as the distillation advances, more and more paraffine in admixture with the thin oil, until at length the product solidifies on cooling, in consequence of its consisting almost entirely of paraffine. All these products, excepting the solid paraffine, are said to be excellent as lubricants under peculiar suitable circumstances—this is, with regard to the character of the machinery to which they are employed.

The oils obtained in this process are of very low specific gravity, ranging from ·790 to ·870. Sperm oil being ·875, they are all more or less unctuous to the touch, and at common temperatures are as fixed as any of the organic oils or fats, boiling only at a temperature approaching that at which the ordinary fats undergo partial decomposition, and then distilling over unchanged.

Having now seen how this mineral oil is obtained, the question arises as to the characters and conditions which render it superior to other substances as a lubricant, or indeed whether such is really the case. A glance at the chemical constitution of this oil will perhaps enable us to form an opinion on one part of the subject.

Referring again to the characters of the ordinary fat oils, we shall find that they consist essentially, in all cases, of certain chemical combinations of carbon, hydrogen, and oxygen, the proportions of which vary slightly according to the nature of the oil; but the specific character of oxygenated compounds belongs to all oils and fats of this class. Such being, then, the chemical nature of these substances, it is obvious that in the element oxygen they contain within themselves the principle of oxidation, and that under the influence of an action which, like fermentation, can establish a tendency to chemical change among their own elements, compounds may be formed, acid or otherwise, without the intervention of external agents; and these compounds may, as we have already seen, possess chemical affinities which enable them to attack and enter into combination with any oxidisable metal with which they may be brought in contact.

Independently, too, of the oils commonly employed in lubrication containing oxygen which might be the means of effecting changes such as we have mentioned, they are themselves all more or less susceptible of oxidation from the influence of external agencies, and the moment this oxidation takes place the normal character of the oil is lost. If we turn now to the consideration of the chemical constitution of the "mineral oil," we find that it differs in one very important particular from the oils or fats of organic origin. It contains, in fact, no oxygen, being a compound of two elementary substances only, viz., carbon and hydrogen. This oil belongs, indeed, to an extensive class of compounds, called hydro-carbons; and so entirely free is it from any oxidising tendency or power, that substances having the most energetic affinities for oxygen, and capable of taking it from any matter in which it exists in combination or otherwise, are perfectly protected from that action by being kept immersed in it. Thus, potassium and sodium—metals whose oxidising tendency is so powerful that they can be only preserved in the metallic state with difficulty—can be kept in the mineral oil entirely unacted upon, and maintaining their brilliancy of surface when freshly cut. There is another point to be considered: the hydro-carbons, and the mineral oil among the rest, have not the slightest tendency to combine with oxygen themselves—at least, under any ordinary circumstances. One of their great characteristics appears, indeed, to be an intense internal conservative principle or force which counteracts any liability to change among their own elements, and which may be even communicated to organic substances placed under their influence, as many perhaps all, of these substances possess a strong antiseptic power. The substance paraffine,

which enters so largely into the composition of this oil, is perhaps the most inert of chemical compounds: it is quite indifferent to other chemical agents, even of the most powerful kind, and cannot be made to form any combinations with them; hence its name (*parum affinis.*) As these oils are thus chemically exempt, then, from the influence of the agencies to which they are exposed, they are not only preserved from any change which may cause them to act injuriously upon the metals with which they are in contact, but are likewise incapable of experiencing those changes which cause the common oils to thicken and dry. The consequence of this is, that they physically remain unaltered as lubricants during any length of time, as they appear, from some experiments made in connexion with this part of the subject, to be quite insusceptible of drying when exposed upon a non-absorbent surface. The following results were obtained in testing this mineral oil against other oleaginous matters and their mixtures with the mineral oil itself. The trials were made with the Glasgow oil-testing apparatus (M'Naught's).

Sperm oil, taken as a standard	=	100
Mineral oil, the thinnest kind	=	18
Do. do. containing more paraffine	=	30
Olive oil and mineral oil, equal parts	=	48
Lard oil and mineral oil, equal parts	=	54
Do. do. do. 2 parts to 1	=	63
Refined rape oil and mineral oil, equal parts ...	=	56

A Reply to an Article in the June Number of the Canadian Journal,

AND ENTITLED

"*Report of the Select Committee on the Geological Survey of Canada. Minutes of Evidence.*"

BY E. J. CHAPMAN, PROFESSOR OF MINERALOGY AND GEOLOGY IN UNIVERSITY COLLEGE, TORONTO.

[We should have been glad to have afforded the following communication from Professor Chapman a more prominent place in this number of the *Journal;* having, however, received the MS. after the first two sheets were struck off, no alternative remained but to submit it in its present place. We allow the "reply" to pass without any allusion to the admission into these pages of the offending parts of the review; the argument which Professor Chapman has preferred to adopt in his defence, rendering any reference to it altogether unnecessary. We have merely to remind Professor Chapman and his so-called "anonymous assailant," that no renewal of the discussion can take place in the pages of this *Journal.*]—Ed.

In the last number of the *Canadian Journal* there appeared an anonymous article, purporting to be a review of the "Minutes of Evidence" in the case of the late inquiry respecting the Geological Survey question, at Quebec. This article, it must be evident to every unprejudiced reader, is little else than a direct attack upon my professional reputation and character. The quotations from my evidences, disjointed, partially given, and taken out of place; the italics and notes of admiration; and above all, the gratuitous and most unwarrantable assumptions, so largely indulged in by the anonymous writer—are sufficient proofs of the justness of my assertion. It is to be regretted for the sake of truthfulness and fair play, that an opportunity was not afforded me to print my answer simultaneously with the attack, as the latter may be read by many persons before whom the reply may never come.

The matters commented upon by my anonymous assailant, belong, I believe, almost entirely to Questions 44, 55, 47, and 54, of the Minutes of Evidence. I will take up these separately, and in the order adopted in the Journal.

"*Question* 44. Have you ever been practically engaged in any Geological Surveys?—*Answer.* Yes, in several: principally for Railway and Water Companies. I have also taken part in Mining surveys; and I may mention, as lending more weight to my evidence on this occasion, that I am the author of several works on Mineralogy, and of a considerable number of published papers on Mineralogy, Mineral Chemistry, and Geology, many of which have been translated into foreign scientific Journals. For three years, likewise, I was a Professor in University College, London."

The last sentence is omitted in the Journal Report, and the words "for Railway and Water Companies" are in italics. The writer then observes in continuation, "We may perhaps be permitted to question whether the implied comparison* between a geological survey for "Railway and Water Companies and the Geological Survey of Canada—a vast country containing 300,000 square miles—is either philosophical or just; a doubt which is far from being dispelled by the perusal of the question and answer subjoined, &c." This question and answer, No. 55, I will take up presently, merely remarking here, that in the Journal Report only a portion of the answer is given, to the obvious detriment of its value. Now, what was the object of the Committee in putting the above question, No. 44? Evidently to ascertain if I were sufficiently acquainted with the practice of geological field-work to enable me to form a just opinion of the general mode of conducting the present survey, taking, of course, into consideration the difference between an old and new country. That such was, manifestly, the object of the question, is shown by those which immediately follow in the Minutes. My anonymous assailant, so prodigal of inverted commas, does not appear to have the faintest conception of the kind of work involved in a geological examination for railway purposes in a country, for instance, like England, where so many distinct zones of rock may cross and recross a projected line, again and again, within a very contracted area. I do not hesitate to say, that limited as this kind of work may be, it exacts a greater degree of skill and judgment for its successful execution, than is required in many an ordinary survey, in which lines can be traced out and connected from distant points. We have here, broken patches, often repeated upon themselves, in which the exact sequence, dip, thickness, &c., have to be made out, frequently, from the most imperfect data.† A geological survey for a "Water Company" need not also be so small a matter as my anonymous assailant would have people to suppose. When I state, that on one occasion I had the getting up of a geological work of this kind extending over between two and three thousand square miles, I think it may be allowed that I am at least entitled to give an opinion respecting geological field-work without necessarily laying myself open for so doing to foolish and perverse criticisms. Surely, it must strike us also, that the chairman and members of the Committee exhibited great lack of judgment or great forbearance, if my answer to this, their first question, were so conclusive of incompetency as this anonymous writer would have us to infer, in wasting the remainder of the morning by continuing my examination. The thing speaks for itself.

Let us now revert to the second question of the Journal Report, the 13th question of my Evidence, No. 55.

I was here asked if I could "give instances from my own experience in geological surveys of the practical importance of results which at first sight might appear to be exclusively of scientific interest." This question I could only answer generally, and I will say, without fear of contradiction from any honest critic, that there are many able geologists constantly engaged in practical investigations, who could do no more. It must be obvious, that these peculiar instances, taken in a special point of view, are necessarily of rare occurrence; more especially in countries like England and France, where so much is already known. I gave in reply one or two cases of a practical character, which suggested themselves to me at the time, somewhat bearing on the question at issue; and it is with these that the anonymous reviewer pretends to be particularly amused.‡ Now, these cases certainly did not appear to be so very absurd to the chairman and members of the Committee, nor to Mr. Logan and Professor Hall, of Albany, who were in the room whilst I gave my evidence. Indeed, at the close of this evidence, and on more than one occasion since, Mr. Logan was kind enough to express himself fully satisfied—not to use other terms which

* Query—implied by whom? certainly not by the witness. He is here, be it observed, answering a straightforward question put to him by the Committee, and making no comparison whatever. The manifest object of the question is pointed out further on.

† In illustration I might quote, amongst others, a complicated piece of work in Wiltshire and Somersetshire, performed by me in the place of Mr. Wm. Froude. No less than eight distinct geological formations here came under review, in great part in a broken and much disturbed country. It was on one of Mr. Brunel's lines.

‡ He states—I quote from the Journal—"Mr. Chapman was asked to give instances from his "own experience in such surveys of the practical importance of results which at first sight might appear to be exclusively of scientific interest," and with commendable candour he limited his instances to those which had come under his independent observation, &c." Why, in the name of decency, what would this person have, with his "commendable candour!"

might lay me open to a charge of self-laudation—with my replies. Were Mr. Logan now in Canada, I am quite sure that he would give me such a testimonial as would refute in itself to the full, these unworthy attacks. One thing at least must strike us as rather curious, if we be inclined to adopt the conclusions of my anonymous assailant. How came it, I would ask, that, after I made this lamentable exhibition of myself at Quebec, Mr. Logan was so wanting in judgment as actually to request me, to undertake in his name, on account of the survey, a geological inquiry into the pretended occurrence of coal in this part of the country. The inquiry, as things turned out, was certainly not a very difficult one; but that has nothing to do with the question. The bare fact of my having been asked to undertake it, is a sufficient recognition of my capability by Mr. Logan: more especially when he subsequently had the kindness to declare himself well pleased with the manner in which I performed his commission. I trust that I may not be accused here of egotism; but, even at that risk, I am induced to bring this matter prominently forward, as a direct answer to the anonymous imputations attempted to be cast upon me. I stated above, that only a portion of my reply to the question at issue, No. 55, was given, I now take the liberty to subjoin the remainder:—

"The study of organic remains, again, is sometimes thought by persons unacquainted with the whole bearings of the question, to have little or no connexion with the practical applications of Geology; but this is altogether an erroneous conclusion. Fossils or organic remains have a two-fold value; first, in revealing to us the history of past creations, and many of the physical changes which our Planet has gone through: and, secondly, in enabling us to determine the relative position of rock groups; each group, within certain limits, holding its own peculiar forms. Now, it is well known that certain economic products are confined over wide areas, either wholly or principally, to certain rocks. To fix the exact positions of these rocks, therefore, in the entire series of strata, becomes a problem of the highest importance, and one, it may be safely affirmed, that in nine cases out of ten, can only be solved by the study of organic remains. In North America, for instance, we have many bands of rock stretching far and wide across the continent. One of these is remarkable for its richness in brine springs and gypsum beds; and by the fossil forms in the bands above and below this, it can be ascertained at points far distant from one another, if we be above or below, near or distant from, the salt and gypsum yielding rock; whereas, if mineral characters alone were attended to, no reliance could be put on any decisions of the kind. In like manner, the position of the Mountain limestone, so rich in many countries in veins of lead ore, of the coal-bearing rocks, again, and of all the other rocks in the series, however closely resembling one another in structure and mineral composition, can be determined with perfect confidence if sufficient Palæontological data be afforded. We thus see that a study apparently only of scientific value, and one worked out in the first instance by scientific researches, has become of the highest importance in a purely practical point of view. In England, as in all other countries indeed, many striking examples may be found of what the study of organic remains has effected for practical science. In rocks far beneath the coal measures, as well as in others far above them, I have seen old shafts, for instance, which must have swallowed up thousands of pounds, still remaining as memorials of futile researches after coal, before geology was prosecuted as a science."

The next question adverted to by my anonymous assailant, is Question 47 of the Minutes of Evidence. In his remarks on my answer to this question, he betrays in a remarkable manner either the greatest obtuseness, or a degree of uncharitableness that no law of criticism can excuse. My character for veracity is here seriously impeached, and in the most wanton manner. The question runs as follows:—

"47. Have you had an opportunity of ascertaining the progress that has been made in the Geological Survey of this Province; and what is your opinion of that progress?—*Ans.* I have devoted several days to a very careful examination of the work already performed, and the materials collected under Mr. Logan's direction; and I can only express my wonder that so much should have been done; considering more especially the small means hitherto at Mr. Logan's disposal, the want of Topographical maps, and other difficulties incidental to a new country."

To this the anonymous reviewer appends the following remarks:—"No one would suppose that a just appreciation of the value of the results already obtained by the survey, could be derived from an inspection even during broad day-light of the minerals collected, as they may have been obtained from localities commercially inaccessible. but, when they "lie in a great measure, buried in packing-cases in the vaults and sheds of the Survey Office, (see Report of Committee) the difficulty is proportionately increased. It is only by a study of the published reports of the work already done, that correct impressions can be obtained of the real value of the Survey. We confess, therefore, to some degree of surprise at finding Mr. Chapman state in the continuation of his evidence, that "several of Mr. Logan's valuable reports, moreover, are out of print, and *I have been quite unable to obtain copies of them.*"

Answering the last allusion first, I may observe that it is one thing not to be able to obtain copies of these Reports, and another not to have seen them.* It was in answer to quite a different question (No. 49) that I expressed the desirableness of having these Reports revised and republished in a single volume; and to show how scarce they had become, I stated my inability to procure copies of several of them. But what has this to do with my appreciation of Mr. Logan's labours? All of the Reports were at my disposal at Montreal; and, if I be not greatly mistaken, we had them with us in the waiting-room attached to the committee-room at Quebec.

The main question here turns, however, on my ability to speak to the value of the actual labours and achievements of the Survey. "No one," says the sagacious reviewer, "would suppose that a just appreciation of the results already obtained by the Survey, could be derived from an inspection even during broad day-light, of the minerals collected, as they may have been obtained from localities commercially inaccessible; but, when they lie in a great measure buried in packing-cases in the vaults and sheds of the Survey Office, the difficulty is proportionately increased." From whence did the anonymous reviewer derive his authority that my appreciation of the value of the Survey was drawn from this source? He would here manifestly imply that I had given false evidence, or what is the same thing, that I had borne testimony to the value of the Survey without knowing anything that had been done upon it.

I feel, certainly, a keen sense of degradation in being obliged to reply at all to such a charge. But how did I obtain my knowledge? Simply thus, by a close and laborious examination of plans, sections, field-books, and other documents, both published and unpublished, laid before me, and carefully and minutely explained by Mr. Logan in person. If it be any satisfaction to my assailant, I am not too conceited to confess, that I gleaned a rich harvest of geological facts, apart from those more especially belonging to our subject of inquiry. Such, then, —not omitting also a general examination of a large portion of the materials collected on the Survey, and at that time under process of arrangement in different rooms belonging to the Museum—was the way in which my knowledge was obtained. If we add to this my acquaintance with the mode of procedure adopted on the Geological Survey of Great Britain (see my answers to Questions 45 and 46, and part of Mr. Logan's answer to Question 70), it must be evident to every impartial person that I was perfectly qualified to reply on these points to the inquiries of the Committee.

My anonymous assailant then proceeds to a discussion of my answer to Question 54. He says:—

"Mr. Chapman is asked by the Committee to state some of the new Scientific Truths which have been derived from the Survey, and he enumerated among others the following:—"Another very interesting discovery is that of the crustacean tracks on the Potsdam Sandstone. The celebrated discussion to which this has given rise in England has attracted the attention of scientific men all over Europe to the results of the Survey." Had Mr. Chapman enjoyed the opportunity of studying Mr. Logan's admirable Report for 1851 and '52 he would have known the name and designation of the real discoverer; or had he met with the fourth edition (1852) of Sir Charles Lyell's Manual of Elementary Geology he would have found the following circumstantial notice of the "tracks," with the date of the discovery, and thus avoided leading the Committee into error on a subject familiar to every amateur geologist in Canada."

Here follows the quotation from Lyell's book, with the accompanying remarks at its close:—"We may here remark that Professor Owen first inferred (1851) that the tracks were those of a fresh water or estuary tortoise. Agassiz supposed that they were crustacean, in

* In illustration of this, one would think, self-evident assertion, I may remark, that before I left England I procured a copy of the second volume of Hall's Palæontology of New York, and that I am still trying, but without success, to get a copy of the first volume. At the same time we have the work in our College Library; so that without actually possessing it I have become perfectly familiar with its contents.

which view Professor Owen coincided in 1853." (See Journal of the Geological Society, August, 1853.)

Here, then, I am accused of ignorance, and leading the Committee into error. First, as to the ignorance. A complete and circumstantial history of these fossil tracks was given to me personally in England by Mr. Logan, on one of the few occasions on which I was in his society, before I came to Canada; and as to the edition of Lyell's Manual, in which an account, though by no means a complete one, of these tracks is given, I happen, unfortunately for the argument, to possess from accidental circumstances no less than a couple of copies. Besides which, on more than one occasion, I have publicly referred in my lectures to the various points connected with this discovery. But when persons are so exceedingly hypercritical, surely they should be exact also. Now, the truth is, Mr. Abraham, although the announcer, was not the real discoverer of these tracks. They were first detected by a miller residing near the spot; and the discovery being brought by this miller, (whose name science unjustly ignores), or by some of his neighbours, under the notice of Mr. Abraham, that gentleman published an account of the matter in the *Montreal Gazette*. Mr. Logan then took up the subject, and pointed out certain geological errors into which Mr. Abraham had fallen. Again, the second and correct determination of the nature of these tracks was made by Owen, not in 1853 as incorrectly stated, but in the early part of 1852. Although dates in scientific matters are serious things, I should scarcely have thought it worth while to notice this error, were it not to show in its true light the ridiculous parade of erudition here brought against me.

Secondly, I am accused of misleading the Committee. But let us see how the case actually stands. I am asked by the Committee, as to the *establishment of new scientific truths* (the italics are my own) in reference to the labours of the survey. Now, I will maintain that the "establishment" of this discovery as a new scientific truth is entirely due to the exertions of Mr. Logan. If the survey had not been instituted at the time, one of two things must inevitably have followed: the discovery would have been a ten days wonder, and then passed out of mind; or, it would have been taken up by some of our scientific neighbours, and the merits of its further developement thus lost to Canadian geology. In 1851, Mr. Logan laid before the Geological Society of London, a large slab of the rock containing these tracks, together with a series of casts relating to the same, and a minute account of their occurrence. In 1852 he again crossed the Atlantic with further casts and more ample particulars, and thus led to the determination by Professor Owen, with whom Mr. Logan put himself in immediate communication, of the true nature of the animals by which these tracks were made. If, after this, the Geological Survey of Canada may not claim the merit of "establishing" the discovery as a scientific truth—and, be it remembered, I spoke to nothing more—with whom, I would ask, in the name of justice, does the merit lie?

But to place my position fairly before the reader, the entire question and answer should be given.

"54. The results to be expected from a Geological Survey being two-fold; the establishment of new Scientific truths, and the discovery of facts and materials of Economic application, can you state to the Committee some of the advantages in both of these branches, which have been already derived from the Survey, and may be expected from its future extension?—*Ans.* With regard to Economic discoveries, I may state generally, that the Survey has brought to light the existence of beds of workable Peat, before, I believe, unknown in Canada, or at least undescribed: of Slate of excellent quality, of Limestone bands, where Limestone was supposed to be absent, and of Lithographic stone, Serpentine, Soapstone, White brick clay, and other valuable materials, previously altogether unknown or undiscovered, along the localities indicated by the Survey; it should also be remembered in an enquiry of this kind, that *positive* discoveries are not the only facts of importance to be made known, *negative* results being in many instances almost equally valuable. Of this latter class, the proof of the non-existence of Coal over the greater part if not the whole of Canada, is entirely due to the Survey; whose labours have thus put a stop to much useless expenditure of money in futile researches after that mineral. Looking at the Survey again, in a Scientific point of view, we find it elaborating many facts of the highest interest, some of which, I do not hesitate to say, may take rank with anything made known of late years by European Science. The discovery of Phosphate of Lime as the chief component of certain shells, is a striking case in point. It was long considered as a settled fact that the Chemical composition of the bones and teeth of vertebrated animals differed entirely from that of the shells and hard parts of the lower classes of the animal kingdom: consisting in the former essentially of phosphate, and in the latter, of carbonate of lime. This fancied difference has been broken down so far as regards certain brachiopods, by the chemical researches of the survey; a discovery which will, no doubt lead to important deductions. Another very interesting discovery is that of the crustacean tracks on the Potsdam sandstone. The celebrated discussion, to which this has given rise in England, has attracted the attention of scientific men, all over Europe, to the results of the survey. Several new minerals have likewise been discovered, and errors have been rectified in regard to species long known. A great deal of light has also been thrown on the complicated question of the metamorphism of rocks, and from the investigations now being carried on, both by Mr. Logan and Mr. Hunt, much more may be shortly expected. There can be no doubt also, that when the complete investigation of our Canadian rocks is accomplished, so far as to justify minute comparison with rocks of the same age in the United States and Europe, many important generalisations will be arrived at, leading in the end to a revised grouping and nomenclature. Finally, it should be borne in mind, that the chief attention of the survey has been hitherto bestowed on economic questions, the scientific investigation of the geology of the Province having been made in a great degree subservient to these. As the survey progresses therefore, its science will be necessarily more fully developed."

Alluding, towards the close of his attack, to the first part of the above answer, my anonymous assailant affects great indignation at the omission of certain economic substances from my list;* although it will be seen I stated to the Committee that I spoke in general terms, and also that the phrase "and other valuable materials" occurs at the end of my enumeration. It was at the same time distinctly understood in the committee-room that the question of economics was to be taken up in full by Mr. Logan, and hence the comparative brevity of my reply. The "serpentine" and "soapstone", and the "bringing to light the existence of valuable beds of peat," seem, from their inverted commas, to be thought fair game for the critic's irony. But what do we find, in relation to these matters, in Mr. Logan's evidence, given the day after mine. I quote from that gentleman's answer to question 89:—

"Soapstone is a material pointed out as existing in abundance. There are many establishments in the States whose business is devoted to the manufacture of it alone, and the Canadian localities are coming into operation. From what we have reported of peat and from the dearness of domestic fuel, a person in Montreal has commenced preparing and selling it for house use, at $5 per cord of 128 cubic feet unpressed, and $12½ for the same bulk pressed. I tells me that braziers and blacksmiths have been using some of it to their satisfaction, and I am aware that some enquiry has been making about it for the smelting of iron. It is used for such a purpose in France and other countries. It is known that 40,000 people are employed in France in the preparation of peat in various ways."

The serpentine, white-brick clay, &c., are spoken of in other answers. Here then, I have at least the satisfaction to know, that if my reference to the peat have anything ridiculous about it, Mr. Logan has kindly placed himself in a similar dilemma.

In conclusion, I would observe, that a mode of assault commonly followed in hostile criticism, is first to ferret out errors or imperfections in the subject-matter—or to create such, if they chance to exist only in the wish or distorted imagination of the critic—and then to base on these real or imaginary shortcomings, a system of inferences, worked out in a sarcastic spirit with a view to irritate the feelings or affect the reputation of the writer. This latter element constitutes the main part of the attack upon me in the anonymous article admitted into the last number of our Journal; and it must be evident to the impartial reader, that if I were disposed to retaliate in a similar spirit, I have abundance of materials at command to enable me to do so with success. In my reply, I have necessarily limited myself as closely as possible, to a bare refutation of the charges and insinuations brought against me. I have thus shewn:—

First, that my past labors in practical geology, although certainly not comprising a survey of 300,000 square miles, have been amply sufficient to enable me to give legitimate evidence on the working of our Canadian Survey, on the best means of bringing its results before the country, and on the future requirements of Mr. Logan's staff.

Secondly, that after a good opportunity, during my constant inter-

* These, it will be noticed, he gleans from an answer in Mr, Logan's evidence.

course with him at Quebec, of testing my fitness or unfitness, Mr. *Logan did not hesitate to request me to perform in his name*, a geological examination; and that he has expressed himself perfectly satisfied with the manner in which I conducted it.

Thirdly, that my evidence in relation to the amount, &c., of work already performed by the survey, was not derived from "an inspection of packing cases buried in the vaults of the survey office"—as gratuitously inferred by my anonymous assailant—but amongst other sources, from a careful examination of published and unpublished documents in great numbers, placed in my hands by Mr. Logan, and elaborately explained by that gentleman in person.

And, lastly, that with regard to the establishment as a scientific truth" of the deductions flowing from the "Postdam-sandstone tracks," my evidence before the Committee, is fully borne out by what I have said above. The tracks were not in the first instance actually discovered by Mr. Abraham, as erroneously stated in the Journal; and, allowing all praise to that gentleman for his investigation and announcement of the matter, I put it to every lover of fair-play, if, without the interference of the survey, without Mr. Logan's exertions the merit of the discovery would not have incurred the greatest risk of being lost to British science. I can only say that amongst scientific men, no one questions for a moment to whom the credit belongs.

These facts established, I may pass, without reply, the pseudo-facetious remarks and attempts at witticism indulged in by my anonymous critic. They would be harmless enough, indeed, in themselves, were it not for the too-evident prejudice to which I find it difficult to avoid tracing their origin.

The Great Court in the Crystal Palace at Sydenham.

Passing on from the Niobe, the visitor runs an almost painful gauntlet between a row of objects, among which it is almost as difficult to advance as to halt. He pauses before the statue of Antinous, so much more divine than his attendant Genius; pores over small bas-reliefs of dancing figures—each a fountain of living art in itself—lingers entranced before that heavenly apparition in a halo of transparent drapery, who is descending, or condescending, to the sleeping Endymion; glances along a wall hung with morsels and fragments to which history can give no name, and for which art needs none; tracing in each that school from which modern Italy drew her inspiration, and when in its refined decorum—the only morality of art—was purposely fitted to guide the purity, the fervour, and the ignorance of Christian art; nay, in some cases identifying the very forms which have served as models: here, a figure all fluttering with heavenly speed, which, transposed by a Christian hand, became an announcing angel; and there, graceful maidens with musical instruments, who need but wings to convert them into adoring Seraphim.

It is here with the eye saturated with beauty, that something like justice can be done to our matchless Elgin marbles. No matter how the taste may have risen with what it feeds on, Phidias still stands on a pinnacle above it. There lie those Fates—or whatever these figures may represent—like petrifactions of a higher order of beings, headless, armless, footless, yet with that plenitude of grandeur in their rich ample laps which alike defies annihilation and analysis. Happy the artist, and modest and wise, who can study these unrivalled remains; mark their strength and glory, their truth and delicacy—follow the magical rendering of the form, trace the exquisite flow of the drapery, and so far forget all thoughts of self as to return home with inspiration in his heart and not despair.

Classification of the Different Varieties of Canadian Woods, Specimens whereof form the Canadian Collection for the Paris Exhibition.

1° MAGNOLIACEÆ.

White wood, so called in this country, (Liriodendron tulipifera. Linn.)

2° TILIACEÆ.

Bass-wood. (Tilia Americana. Linnée.)

3° ANACARDIACEÆ.

Sumac. (Rhus typhina, Linnéo.)

4° ACERACEÆ.

Sugar maple. (Acer saccharinum Linnée.)
Rock maple, " "
Curled maple " "
Birds-eye maple, " "
Soft maple. (Acer dasycarpum. Ehrhart.)

5° AMYGDALEÆ.

Wild yellow plum. Prunus Americana. Marshall.)
Red cherry. (Cerasus Pennsylvanica. Loisel.)
Black cherry. (Cerasus serotina. De Candolle.)
Choke cherry. (Cerasus Virginiana. De Candolle.)

6° CORNACEÆ.

Cornel, flowering dogwood. (Cornus Florida. Linnée)

7° POMACEÆ.

Dotted or Apple Thorn. (Cratægus punctata. Jacquin.)
Red Thorn. (Cratægus coccinea. Linnée.)
White Thorn. (Cratægus crus Galli. Linnée.)
Mountain Ash. (Pyrus Americana. De Candolle.)
June or Service berry. (Amelanchier Canadensis. Torrey and Gray.)

8° FRAXINEÆ.

White Ash, (Fraxinus Americana. Linn.)
Black Ash, (Fraxinus Sambucifolia. Lambert.)
Rock Ash, (Fraxinus Pubescens. Walter.)
Rim Ash, Fraxinus Juglandifolia. Lambert.)

9° LAURACEÆ.

Sassafras, (Sassafras Officinale. Von Esenbeck.)

10° ULMACEÆ.

White Elm, (Ulmus Americana. Linn.)
Red or Slippery Elm, (Ulmus Fulva. Michaux.)
Rock Elm, (Ulmus Racemosa. Thomas.)
Gray Elm, (" ")

11° JUGLANDACEÆ.

Butternut, (Juglans Cinerea. Linn.)
Black Walnut, (Juglans Nigra, Linn.)
Soft Walnut.
Shell bark Hickory, (Carya Alba. Nuttal.)
Smooth bark Hickory, (" Tomentosa. Nuttal.)
Pignut, (" Glabra. Torney.)
Bitternut, (" Amara. Nuttal.)

12° CUPULIFERÆ.

White Oak, (Quercus Alba. Linn.)
Swamp White Oak, (" Bicolor. Willd.)
Red Oak, (" Rubra. Linn.)
Black Oak, (" Nigra. Linn.)
Chesnut, (Castanea Vesca. Linn.)
White Beech, (Fagus Ferruginea. Aiton.)
Blue Beech, Horn-Beam, (Carpinus Americana. Michaux.)
Iron Wood, (Ostrya Virginica. Willd.)

13° BETULACEÆ.

Paper or Canoe Birch, (Betula Papyracea. Aiton.
Yellow Birch, (" Excelsa. Aiton.)
Cherry Birch, (" Lenta. Linn.)
Black Birch, (" Nigra. Linn.)
Alder, (Alnus Incana. Willd.)

14° SALICACEÆ.

Black Willow, (Salix Nigra. Marshall.)
Aspen Poplar, (Populus Tremuloides. Michaux.)
Large-Toothed Aspen, (" Grandidentata. Michaux.)
Balm of Gilead, (" Balsamifera. Linn.)
Cotton Wood, Necklace Poplar, (Populus Monilifera. Aiton.)

15° PLANTANACEÆ.

Button-Wood, American Sycamore, (Plantanus Occidentalis. Linn.)

16° CONIFERÆ.

Pitch Pine, (Pinus Rigida. Miller.)
Red Pine, (" Resinosa. Aiton.
Yellow Pine, (" Mitis. Michaux.)
White or Weymouth Pine, (Pinus Strobus. Linn.)
Balsam Fir, (Abies Balsamea. Marshall.)
Hemlock Spruce, (" Canadensis. Michaux.)
White Spruce, (" alba. Michaux.)
Black Spruce, (" nigra. Poiret.)
American Larch, Tamarack, Larix Americana. Michaux.)
White Cedar, (Thuya occidentalis. Linn.)
Red Cedar, Savin, (Juniperus Virginiana. Linn.)

These woods are found in abundance in all our forests, with very few exceptions; they are, with respect to the soil proper to each, subject to the same conditions as in other countries. The only remark of a general nature which we may here make is, that the families of *juglandaceæ* and *cupuliferæ* are more particularly the produce of the Western section of the Province, while those of the *coniferæ* and *aceraccæ* are more particularly that of the Eastern section.—*Off. Report.*

The Eruption of Vesuvius.

Prof. Palmieri, of the Observatory of Naples, has made a valuable Report on the Eruption. It appears that the needles of the apparatus of Lamont, which had been slightly affected on the 29th of April, were greatly agitated on the 30th; and on the following day the eruption broke out. No fewer than ten craters opened in the course of a few hours, followed by many smaller ones, all throwing out lava and heated stones, accompanied by subterranean thunders and ruddy masses of smoke. These streams, descending into the plain, called the "Atrio del Cavallo," formed there a sea of fire, whose shores were on either side the Mountain of Somma and the lava of 1850. The materials which formed this sea, swelling from moment to moment, at length poured into the "Fosso della Vetrana," forming a wonderful cascade. The enormous quantity of lava, ever increasing, filled up the valley at the back of the Hermitage; and pouring into the "Fosso del Favaone," formed another cascade, and rolled down in the direction of several townships in the valley. Early in the progress of the eruption, the lava was 100 palms in depth; and it was considered that if another such an accumulation took place, which certainly has now happened, the Hermitage and the Observatory would be in danger. In fact, they have been vacated, and the instruments removed. The precise number of craters it will be impossible to determine till all is tranquil. The same may be said of the materials ejected; though we have observed chloride of iron, gaseous matter destructive to life, and muriatic acid gas.

The magnetic apparatus of Lamont was used by Prof. Palmieri on the occasion of the earthquake of Melfi; and the results were such as to induce him to think that it would not be mute, as the event has proved, on the occasion of an eruption of a volcano. Anticipating, as it had done, such a catastrophe by several days, it is one of the most beautiful and convincing proofs of the practical applicability of science to the service of human beings that modern days has furnished us with. How many lives might have been saved,—how many may yet be saved by the needles of Lamont!

Passing from magnetism to electricity, Prof. Palmieri says, that on the first day of the eruption observations were impossible; but on the clouds clearing off, he ascertained that there was a great tension of positive electricity, which increased considerably on the fall of some ashes on the evening of the 2nd inst. In general, the electricity was always stronger when the wind blew towards the Observatory. It manifested itself very vigorously to the moveable conductor, not always to the fixed conductor; "and during the fall of the ashes," he says, "I verified a curious fact, which I have observed during the fall of rain, also, that whilst with the moveable conductor we had positive electricity, with the fixed conductor a faint, negative electricity was observed." During the course of the greater quantity of lava in the "Fosso della Vetrana," on the north of the Observatory, the thermometer stood 8° higher than on the opposite side of the building.

The lava, after falling into the Fosso del Favaone, progressed from that point as from the apex of an angle, in two directions,—one being down on the townships Cercola, St. Sebastiano, and Massa di Somma; the other, at a later period, in the direction of St. Giorgio a Cremano, and St. Jovio, close to Portici. The first branch being the earliest in order of time, was, when I saw it, 3,850 palms from Cercola, on the next day it advanced 500 plams more, and there it has remained almost stationary; whilst during the last ten days the mountain has been pouring down its greatest fury by the other branch towards St. Jovio. The branch in the direction of Cercola was pent within the deep blanks of a wide bed, and was flowing down, not like a fluid, which is the ordinary motion of it, but like a mountain of coke, or at times like highly gaseous coal. It split, and crackled, and sparkled, and smoked and flamed up, and ever moved on in one vast compact body. Pieces detaching themselves rolled down, leaving behind a fierce glare; and as every mass fell down with the noise of thunder, or rolled sideways from the upper surface into the gardens and vineyard yards, the trees flamed up, and the crowds uttered shouts of admiration and regret.

Following the course of the stream, or rather tracing it back to its source, we walked by the side of that huge leviathan, through highly-cultivated ground, now trodden under the feet of multitudes, until we arrived at the edge of a precipice, whence we looked into the boiling flood, fed by the cascade of lava, which was pouring down from above. Full 1,000 feet fell that glowing, flaming Niagara, in one unbroken sheet, over the precipice at the back of the Hermitage and the Observatory. There were times when projections in the face of the lava seemed to impede its course, or when the adhesive character of it appeared to bind it up in a temporary rigidity; then, behind those projections, accumulated tons upon tons of material. It was a moment of breathless expectation:—all eyes were fixed upon that one blackened spot. There was a slight movement:—one heard a click; a few ashes and stones fell down like *avant-courriers*, and down went a mountain of solid fire into the boiling, smoking abyss, with the noise of thunder. The heat and the glare of light were at such times almost insufferable. The branch on the right, which has since flowed down to St. Jovio, in the direction of Portici, was there only an infant rivulet, stealing on its insidious course through a wood of chesnut-trees and wrapping them all in flame. Alas! how much injury has it since occasioned,—how many trees teeming with the promise of fruit and the grape has it laid low,—how much land has it covered with tons and tons of scoriæ, whereon nothing more will grow for a century but the hardy cactus. In some places a hundred, in others two or three hundred, and in one place a thousand feet in width, it rises to the height of one or two hundred feet, and even more, and has progressed eight or nine miles in the face of five or six flourishing and populous villages in the plain. From St. Jovio the summer residents have fled, and taken their furniture with them. At Cercola and Massa, at the termination of the other branch, a bridge has been cut away so as not to impede the free course of the lava: several houses have been removed for the same reason, and several have been either swept entirely away or half surrounded. In this state things remained till Sunday last; a kind of armistice had been established between the mountain, on the one hand,—and the Saints, Ferdinand the Second, the bones of St. Rocco, and the cardinal, on the other. On Sunday last, however, above all other days, the mountain broke the armistice, and the lava has been galloping, not flowing, down ever since. As it flows, however, over the hardened lava of last week, the danger is not imminent, but if it continues, woe to Cercola and Massa. In the St. Jovio direction it does not flow. Again the interest is reviving; Vesuvius presents a more magnificent spectacle than ever, and crowds still throng the best points of view at night, or run down to the mountain.—*Athenæum.*

University College, London.—The Council have received notice of the resignation by Mr. Graham of the Professorship of Chemistry, in consequence of his having received the appointment of Master of the Mint. The resignation was accepted, with regret at the loss to the college of Mr. Graham's valuable services. At the same session announcement was made of the following additions to the property of the college:—The Parliamentary library of the late Joseph Hume Esq., bequeathed by him to the college, the collection of fossils, presented to the college by the late G. B. Greenough, Esq., with a presentation copy of Mr. Greenough's *Physical and Geological map of India*; and the portrait of Harvey, by Mirevelt, a *chef d'œuvre*, bequeathed to the college by the late George Field, Esq., of Isleworth. Proceedings of a former session were confirmed, as follows:—The appointment of Professor Jenner to be physician to the hospital, instead of assistant-physician; of Dr. Thomas Snow Beck and Dr. John Russell Reynolds to be substitutes, each for six months, for Dr. Jenner, as assistant-physician to the hospital for the year during which Dr. Jenner is charged with the duties of Dr. Parkes as physician to the hospital, and special Professor of Clinical Medicine; the appointment of John Dowson, Esq., to be Professor of Hindostanee, with liberty to teach Telugu, until further arrangements shall be made. The Professorship of Bengalee, offered to William Adam, Esq., having been declined by him, proceedings for procuring instruction in that language, as well as in Tamyl and other Indian languages, were postponed. Dr. Hoffman, Chemist to the Museum of Practical Geology, has been appointed to the office of Assayer to the Mint, left vacant by the elevation of Professor Graham.

To Correspondents.

We beg to remind those of our correspondents who have kindly forwarded for publication various communications relating to public or private interests, that it is not desirable that the *Canadian Journal* should be made the medium of bringing into notice any facts or fancies which may give rise to unprofitable discussion, or to which the writer would object, from personal considerations, to subscribe his name.—Ed.

Monthly Meteorological Register, at the Provincial Magnetical Observatory, Toronto, Canada West.—May, 1855.

Latitude, 43 deg. 39·4 min. North. Longitude, 79 deg 24 min. West. Elevation above Lake Ontario, 108 feet.

Day.	Barom. at temp. of 32 deg. 6 A.M.	2 P.M.	10 P.M.	Mean.	Temp. of the Air. 6 A.M.	2 P.M.	10 P.M.	M'N.	Mean Temp. + or − of the Average	Tension of Vapour. 6 A.M.	2 P.M.	10 P.M.	M'N	Humid'y of Air. 6 A.M.	2 P.M.	10 P.M.	M'N	Wind. 6 A.M.	2 P.M.	10 P.M.	Mean Vel'y	Rain in Inch.	Snow in Inch.
1	29·608	29·686	29·763	29·693	51·0	68·2	51·6	57·3	+10·9	0·335	0·433	0·308	0·350	·91	·64	·73	·76	N b W	S b W	N	4·96	...	...
2	·840	·800	·754	·795	49·5	55·9	49·0	51·7	+ 5·0	·308	·158	·270	·251	88	36	79	68	E N E	E b N	E b N	9·37	...	...
3	·768	·761	·751	·763	53·5	59·2	44·7	52·2	+ 5·1	·286	·217	·200	·219	71	44	69	58	E N E	E S E	E b N	7·57	...	...
4	·813	·758	·787	·784	48·1	60·5	47·4	52·1	+ 4·6	·237	·148	·166	·188	72	28	51	51	N b W	N	N b W	14·98	...	...
5	·836	·763	·710	·761	46·7	63·7	49·0	53·3	+ 5·6	·201	·271	·233	·221	64	47	74	57	N b W	S W	N N W	10·72	...	...
6	·609	·478	—	—	47·8	62·0	—	—		·189	·205	—	—	58	37	—	—	NWbW	N b W		10·63	...	...
7	·562	·526	·483	·524	38·2	42·1	34·1	38·1	−10·3	·116	·144	·166	·141	50	55	85	63	E N E	E S E	N b E	6·09	1·000	0·3
8	·353	·469	·568	·476	35·2	39·7	39·0	37·7	−11·1	·199	·202	·213	·202	97	83	91	90	N b N	NEb N	N N W	8·23	0·300	0·6
9	·700	·768	·818	·770	43·1	56·7	38·1	45·4	− 3·8	·152	·226	·167	·182	55	50	72	61	N b E	S	Calm.	5·69	...	...
10	·875	·825	·766	·816	46·3	59·2	42·4	50·1	+ 0·6	·258	·233	·171	·201	83	47	64	58	N	S S W	Calm.	3·88	...	...
11	·741	·630	·602	·651	45·0	64·9	42·4	52·0	+ 2·1	·184	·237	·182	·200	62	40	68	54	Calm	S b W	N b W	6·04	Inap.	...
12	·615	·572	·580	·588	51·0	66·6	48·6	54·3	+ 4·2	·266	·330	·276	·304	72	52	82	74	N b E	S b W	Calm.	1·66	Inap.	...
13	·582	·488	—	—	44·9	68·9	—	—		·256	·343	—	—	87	49	—	—	Calm	S b E		4·42	0·285	...
14	·632	·641	·563	·607	49·5	65·5	51·7	56·2	+ 5·3	·312	·367	·288	·330	89	60	76	75	S WbW	S b E	Calm	1·92	...	...
15	·487	·374	·283	·380	48·5	66·4	59·6	59·9	+ 8·6	·298	·441	·405	·396	89	70	82	79	Calm	S W b S	W b N	8·96	0·340	...
16	·398	·411	·596	·487	52·2	62·1	42·7	51·6	0·0	·354	·278	·214	·276	91	51	79	74	NWbW	NWbW	N N W	8·85	...	...
17	·736	·749	·755	·750	49·5	66 0	45·8	53·8	+ 1·8	·179	·261	·220	·215	50	42	72	54	N b W	N b W	Calm	4·63	...	...
18	·756	·666	·556	·618	46·4	62·7	51 6	55 0	+ 2·7	·219	·229	·207	·232	71	41	55	56	Calm	E N E	E	6·83	...	...
19	·504	·483	·486	·484	52·0	58·6	49·9	53·1	+ 0·5	·265	·349	·279	·303	70	72	79	76	Calm	E b S	Calm	1·32	...	...
20	·470	·458	—	—	57·4	74·3	—	—		·363	·449	—	—	79	55	—	—	N W	S W b S		7·27	...	...
21	·566	·541	·494	·526	51·7	59·6	46·6	53·3	0·0	·199	·223	·255	·231	54	44	81	60	N b E	S b W	Calm.	1·66	...	...
22	·513	·508	197	·512	50·6	63·0	54·3	56·5	+ 2·8	·235	·237	·285	·251	65	42	69	57	Calm	S E b S	Calm.	0·89	...	...
23	·536	·506	·528	·528	54·1	61·0	54·3	56·2	+ 2·2	·245	·371	306	·295	60	70	74	66	E N E	E	Calm.	3·03	0·160	...
24	·566	·617	—	—	56·8	74·8	—	—		·310	·392	—	—	69	47	—	—	NWbW	S b W		4·84	...	...
25	·839	·772	·785	·801	51·7	65·3	47·8	54·9	+ 0·2	·288	·256	·198	·261	76	42	60	62	Calm	N b W	N b W	11·10	...	...
26	·888	·805	·835	·833	45·4	60·7	49·1	53·2	− 1·8	·158	·157	·241	·184	53	30	69	48	N	NWb N	N b W	11·31	...	...
27	·902	·823	—	—	50·6	63·0	—	—		·208	·257	—	—	57	42	—	—	N	S W b S		4·72	...	...
28	·797	·771	·737	·767	50·6	67·8	48·1	56·0	+ 0·3	·231	·286	·218	·261	63	43	66	60	N	S E b E	S E b E	1·82	...	...
29	·777	·758	·729	·755	51·7	71·4	49·5	57·9	+ 2·0	·245	·295	·266	·268	65	39	76	58	Calm	S E	Calm.	1·48	...	...
30	·792	·695	·633	·702	47·5	68·9	52·6	57·7	+ 1·5	·270	·415	·351	·344	84	60	90	74	N N E	E S E	Calm.	2·82	...	...
31	·627	·542	·447	·533	59·2	64·3	57·8	60·3	+ 3·7	·383	·425	·389	·400	77	72	83	78	S S E	S W b S	S b W	6·04	0·486	...
M	29·675	29·646	29·635	29·651	48·8	61·5	48·1	53·1	+ 1·6	·247	·277	·249	·258	·72	·51	·74	·65				7·09	7·96	4·00	5·93	255	0·9

Highest Barometer..... 29·902, at 6 a.m. on 27th
Lowest Barometer..... 29·283, at 10 p.m. on 15th } Monthly range: 0·619 inches.

Highest registered temperature 77°·5, at p.m., 20th
Lowest registered temperature 33°·0, at a.m. on 9th } Monthly range: 44°·5.

Mean Maximum Thermometer..... 65°·40
Mean Minimum Thermometer..... 41°·42 } Mean daily range: 23.98

Greatest daily range.....39°·4, from p.m. of 24th to a.m. of 25th.
Least daily range .....10°·0, from p.m. of 7th, to a.m. of 8th.

Warmest day..... 31st. Mean temperature.....60°·25
Coldest day..... 8th. Mean temperature.....37°·68 } Difference, 22°·57.

Greatest intensity of Solar Radiation, 89°·2 on p.m. of 20th
Lowest point of Terrestrial Radiation, 23°·6 on a.m. of 10th } Range, 65°·6.

Aurora observed on 4 nights: viz. 1st, 8th, 10th, and 16th.
Possible to see Aurora on 20 nights. Impossible on 11 nights.
Raining on 6 days. Raining 30·9 hours; depth, 2·565 inches.
Snowing on 2 days. Snowing 7·0 hours; depth 0·9 inches.

Sum of the Atmospheric Current, in miles, resolved into the four Cardinal directions.

North—2741·56 West—1017·01 South—690·05 East—998·66.
Mean direction of the Wind, N 1° W.
Mean velocity of the Wind, 5·93 miles per hour.
Maximum velocity, 24·7 miles per hour, from 10 to 11 a.m. on 4th.
Most windy day, the 4th; mean velocity, 14·98 miles per hour.
Least windy day, the 22nd; mean velocity, 0·89 " "
Most windy hour, noon; Mean velocity, 9·04 miles per hour.
Least windy hour, 1 a.m.; Mean velocity, 3·41 miles per hour.
Mean diurnal variation, 5·63 miles.
Mean of Cloudiness, 0·46.

1st. Total eclipse of the Moon from 8h 54m p.m. 1st, to 0.45m. a.m. of 2nd.
7th. Snow storm from 3h 30m p.m., continuing during the night.
8th. Snow storm until noon. Cold stormy day.
11th. Halo round the sun at 3 p.m.
15th. Severe thunder storm from 7 p.m. till midnight.
23rd. Thunder storm with heavy rain and large hailstones, from 0h 30m to 1h. 30m p.m.

The results of the above table show that the Mean Temperature of May, 1855, has been 1·°6 warmer than the average of the last 16 years. The total quantity of Rain, 0·4 inch. less than the average; and the velocity of the Wind 0·5 miles per hour greater than the average of the last 8 years.

Comparative Table for May.

Year.	Temperature. Mean.	Dif. from Av'ge	Max. obs'vd	Min. obs'vd	Range.	Rain D's.	Rain Inch.	Snow. D's.	Snow. Inch.	Wind Mean Velocity in Miles.	
1840	53·8	+2·3	74·5	30·8	43·7	9	4·150	...	...	...	
1841	50·5	−1·0	76·2	26·6	49·6	11	2·350	1	Inap.	0·35	lb.
1842	49·1	−2·4	74·3	30·0	44·3	7	1·275	...	...	0·53	lb.
1843	49·1	−2·4	79·6	28·9	50·7	5	1·570	...	...	0·52	lb.
1844	53·6	+2·1	77·7	29·0	48·7	14	5·670	...	...	0·30	lb.
1845	49·6	−1·9	76·6	29·4	47·2	8	2·300	...	...	0·55	lb.
1846	55·5	+4·0	78·1	34·3	43·8	9	4·375	...	...	0·46	lb.
1847	54·4	+2·9	72·5	27·8	44·7	12	2·040	...	...	0·29	lb.
1848	54·1	+2·6	78·5	31·9	46·6	13	2·520	...	...	4·93	Miles.
1849	48·0	−3·5	72·5	32·7	39·8	16	5·115	...	...	5·33	Miles.
1850	47·6	−3·9	76·3	31·1	45·2	7	0·545	1	Inap.	6·32	Miles.
1851	51·3	−0·2	73·2	28·7	44·5	12	2·950	1	0·5	6·34	Miles.
1852	51·4	−0·1	73·3	34·5	38·8	7	1·125	1	Inap.	4·00	Miles.
1853	50·9	−0·6	78·4	38·4	40·0	17	4·420	1	Inap.	5·14	Miles.
1854	52·2	+0·7	69·0	27·6	41·4	11	4·630	...	...	5·38	Miles.
1855	53·1	+1·6	74·8	33·9	40·9	6	2·565	2	0·9	5·93	Miles.
										0·43	lbs.
M'n.	51.51		75·34	30·97	44·37	10·3	2·975	0·4	0·1	5·42	Miles.

Day.	Barom. corrected and reduced to 32° Fahr.			Temp. of the Air.			Tension of Vapor.			Humidity of Air.			Direction of Wind.			Velocity in Miles per Hour.			Rain in Inches	Weather, &c. A cloudy sky is represented by 10; A cloudless sky by 0.		
	6 A.M.	2 P.M.	10 P.M.	6 A.M.	2 P.M.	10 P.M.	6 A.M.	2 P.M.	10. P.M.	6 A.M.	2 P.M.	10 P.M.	6 A.M.	2 P.M.	10 P. M.	6 A.M.	2 P.M.	10 P.M.		6 A.M.	2 P.M.	10 P.M.
1	29·851	29·987	30·051	49·0	70·6	52·6	·336	·541	·326	·93	·74	·81	N W b W	S W b S	N	5·80	1·00	2·50	0·170	Cir. Str. 8.	Cir. Str. 4.	Cl'rFt.Aur.Bor.
2	30·198	30·196	30·200	36·7	62·6	46·6	192	397	243	83	71	74	N E b E	E N E	E N E	0·37	6·10	3·76	...	Clear.	Clear.	Do.
3	30·180	30·105	30·001	38·1	68·3	45·0	173	327	253	72	66	80	N E	E b N	N W	3·20	4·26	0·37	...	Do.	Do.	Do.
4	29·952	29·990	29·999	41·4	56·9	52·1	217	323	304	79	70	76	N	N E b E	N E b N	8·37	10·96	9·32	...	Do.	Cir.Cum.Str. 10.	Str. 9.
5	·982	·976	·936	45·4	66.7	54·1	235	416	283	74	65	66	N b E	N b E	N N W	8·96	9·88	8·08	...	Do.	Do. 5.	Cir.Cum. Str. 6.
6	·720	·734	·785	47·4	52·8	46·0	252	264	176	74	66	76	N N W	N W	N W b N	2·87	10·00	11·55	...	Cir. Cum. 4.	Cum. 4.	Clear Auro. Bor.
7	·798	·845	·877	33·1	54·7	41·0	178	283	217	86	66	79	W N W	W	E	Inap.	0·39	Inap.	...	Clear.	Cir. Str. 8.	Do.
8	·840	·872	·862	40·8	58·0	47·7	217	327	234	80	66	69	N E b E	N E b E	N E b N	1·50	10·05	7·76	...	Light Cirr.	Clear	Do.
9	30·000	30·086	30·099	38·4	53·0	41·1	173	255	210	70	61	75	N E b N	N E b N	N E b N	20·39	16·94	6·20	...	Clear.	Do.	Do. ft.Aur. Bor.
10	30·090	30·050	30·001	32·0	66·0	52·0	167	373	264	83	58	66	N b E	N	N b W	2·50	3·15	1·55	...	Do.	Do.	Do.
11	29·985	29·900	29·894	53·7	73·0	46·6	293	465	274	70	58	70	W	S W	S E	0·94	0·81	0·40	...	Do.	Do.	Do.
12	·843	·911	·930	37·8	74·1	56·0	218	458	385	89	56	84	N E	W S W	W S W	1·03	2·54	2·69	...	Do.	Do.	Do.
13	·915	·895	·815	54·3	74·6	59·9	349	559	402	81	67	79	S b W	S b W	S W	3·75	2·22	3·07	Inap.	Do.	Hazy.	Cir. Cum. Str.
14	·846	·877	·912	53·2	63·7	52·1	386	435	304	93	75	76	W S W	W b N	N W	5·12	10·50	7·15	0·466	Cir. Str. 8.	Cir. 4.	Clear. [thunder
15	890	·740	·671	48·4	55·7	49·9	302	372	349	86	84	94	E N E	N E b E	N E b N	0 30	8·97	Inap.	0·220	Rain.	Showers.	Nimb. 10.
16	·579	·642	·728	60·0	68·4	52·6	510	496	326	98	72	81	W b S	W N W	N W b W	4·75	5·25	9·12	0·900	Str. 10.	Cir. Cum. Str. 4.	Clear.
17	·835	·950	30·002	46·3	63·4	54·0	282	388	283	86	67	66	W b N	N W b N	N N W	2·74	7·25	7·37	...	Clear.	Clear.	Do.
18	30·100	30·149	·9·900	39·5	71·7	58·3	214	506	389	84	67	79	W b S	S S W	S E b S	0·27	0·01	Inap.	...	Do.	Do.	Do.
19	29·934	29·890	·790	54·0	80·1	62·0	373	617	421	87	61	74	N E b E	S S E	S S E	Calm	0·02	0·12	...	Do.	Hazy.	Str. 2.
20	·701	·680	·831	58·0	81·0	50·6	412	617	326	84	60	88	W S W	S S E	N E	Inap.	Calm	11·62	Inap.	Do.	Cum. Str. 4.	Clear.
21	·820	·815	·841	39 0	62·2	47·7	196	375	271	76	67	80	N b W	N E b E	N E b E	13·38	7·53	10·00	...	Do.	Do. 2.	Do.
22	·851	·900	·941	47·6	60·0	44·1	291	393	282	86	75	92	N E b E	E	N E b E	1·55	3·78	2·37	...	Do.	Do. 6.	Do. [a.m. 36°·0.
23	·982	·979	·985	45·9	66.1	52·0	272	440	326	86	68	81	N E b N	S E	N E b E	4·25	2·51	2·25	...	Cir. Str. 8.	Clear.	Cir. 4,lunar halo
24	·820	·801	·900	50·6	76·1	55·0	349	692	372	93	87	84	E N E	W S W	N W	0·11	3·85	10·00	...	Do. 4.	Do.	Clear Auro. Bor
25	·985	·952	30·048	48·0	58·2	43·0	281	274	199	80	55	70	W N W	N N W	N W	12·30	11·68	12·37	...	Clear.	Cir. Str. 8.	Cir. 2.
26	·999	·938	30·001	43·5	55·0	48·9	272	372	261	90	81	74	N W	N W	N N W	9·93	10·63	11·11	...	Do.	Do.	Cum. Str. 8.
27	·998	·943	29·980	46·1	71·1	55·8	253	320	262	92	42	59	W b N	N b W	N	2·61	12·80	10·43	...	Do.	Clear.	Clear.
28	30·060	30·020	30·050	50·6	78·0	58·7	246	428	327	65	45	66	N b W	S b W	S E	3·62	1·90	0·37	...	Do.	Do.	Do.
29	30·095	30·105	30·046	54·4	80.4	56·7	326	506	343	76	50	74	N E b E	S b E	S S W	3·37	Inap.	Calm	...	Do.	Do.	Hazy.
30	30·009	30·000	30·002	57·2	84·5	63·0	376	550	435	79	48	75	S b W	S W b W	S S W	Inap.	1·80	Calm	...	Hazy.	Hazy.	Do.
31	30·030	29·913	29·870	62·0	89·0	72·8	421	588	523	75	44	67	S S E	S W b S	W S W	Inap.	2·03	3·00	...	Do.	Do.	Do.

Barometer ....
- Highest, the 2d day ..... 30·200
- Lowest, the 16th day ..... 29·579
- Monthly Mean ..... 29·697
- " Range ..... 0·621

Thermometer
- Highest, the 31st day ..... 91°·8
- Lowest, the 7th day ..... 28°·9
- Monthly Mean ..... 56°·85
- " Range ..... 62°·9
- Mean Humidity ..... ·743

Greatest Intensity of the Sun's Rays ..... 99°·4

Rain fell on 6 days, amounting to 1·756 inches, raining 15 hours 10 minutes, and was accompanied with thunder on two days.

Most prevalent Wind, N E b E. Least prevalent Wind, E.

Most Windy Day, the 25th day; mean miles per hour, 12·11.

Least Windy Day, the 7th day; mean miles per hour, 0.13.

Aurora Borealis visible on 3 nights. Might have been seen on 18 nights.

The electrical state of the atmosphere has been marked by moderate intensity; and during the storms of the 14th and 15th days indicated a very high tension of a negative character.

Eclipse of the moon on the 1st day visible.

Ozone.—The amount of Ozone was very small in quantity during the month.

Shad first caught here on the 31st day.

Monthly Meteorological Register, Quebec, Canada East, May, 1855.

BY LIEUT. A. NOBLE, R.A., F.R.A.S., AND MR. WM. D. C. CAMPBELL.

Latitude. 46 *deg.* 49·2 *min. North; Longitude,* 71 *deg.* 16 *min. West. Elevation above the level of the Sea,—Feet.*

Date.	Barometer corrected and reduced to 32 degrees, Fahr.				Temperature of Air.				Elasticity of Air.				Humid'y of Air.				Direction of Wind.			Velocity of Wind.			Rain in Inch.	Snow in Inch.	REMARKS.
	6 A.M.	2 P. M.	10 P. M.	MEAN.	6 A.M.	2 P.M.	10 P.M.	MEAN.	6 A.M.	2 P.M.	10 P.M.	MEAN.	6 A.M.	2 P.M	10 P.M	M'S	6 A.M.	2 P.M.	10 P.M.	6 A.M.	2 P.M.	10 P.M.			
					°	°	°	°																	
1	29·617	29·705	29·806	29·709	39·6	51·1	40·5	43·7	0·232	0·272	0·240	0·248	97	74	97	91	Calm.	Calm.	Calm.	0·0	0·0	0·0	...	...	1st. The chief characteristics of the Lunar Eclipse were the violet hue about the boundary between the umbra and penumbra, and the glowing red color of the moon when totally eclipsed. A brilliant Aurora observed. 1st. The wind at 2 p.m.; in gusts, occasionally with a velocity of 35 miles per hour.
2	·952	·960	·995	·969	35·3	41·8	35·4	37·5	·145	·122	·146	·138	70	47	71	63	W	E N E	Calm.	8·8	8·0	0·0	...	...	
3	30·005	·860	·767	·877	33·7	47·1	38·1	39·6	·142	·149	·152	·148	74	46	67	62	Calm.	E	N N W	0·0	9·3	5·2	...	...	
4	29·727	·725	·741	·731	36·5	42·0	41·9	40·1	·190	·235	·248	·224	88	89	91	90	E N E	E N E	E N E	2·0	10·9	5·2	·058	...	
5	·712	·674	·695	·660	42·6	51·0	51·8	48·5	·255	·252	·132	·216	94	69	35	66	Calm.	E N E	N W b N	0·0	7·2	12·4	...	...	
6	·420	·398	·448	·422	44·6	46·3	36·3	42·4	·193	·182	·189	·188	67	59	88	71	W	E N E	Calm.	2·0	13·4	0·0	...	...	
7	·497	·582	·671	·583	35·9	46·0	39·0	40·3	·169	·168	·188	·175	81	57	80	73	Calm.	E	E N E	0·0	7·2	11·3	...	...	
8	·671	·652	·750	·691	36·5	46·1	41·5	41·4	·187	·116	·091	·132	87	38	36	54	N E	E	E	2·0	17·9	16·0	...	...	
9	·876	·884	·895	·885	36·0	43·1	39·2	39·4	·123	·105	·134	·121	59	39	56	51	E N E	E	N	13·7	27·8	7·2	...	...	
10	·838	·779	·756	·808	35·0	51·1	42·4	42·8	·136	·082	·137	·118	68	22	51	47	Calm.	E b N	N	6·0	15·2	2·0	...	...	
11	·744	·687	·693	·708	37·1	48·8	41·0	42·6	·152	·108	·198	·153	69	32	75	59	Calm.	E	N N E	0·0	13·4	8·0	...	...	
12	·691	·619	·707	·672	39·1	60·8	43·1	47·7	·205	·156	·201	·188	87	30	74	64	N E	S E	E N E	5·2	5·2	12·4	...	...	
13	·778	·646	·583	·669	40·8	57·7	46·0	48·2	·205	·262	·250	·239	81	56	83	73	E N E	E	E	8·8	3·8	8·0	·438	...	
14	·563	·533	·662	·586	46·6	60·7	47·3	51·5	·305	·220	·179	·241	100	42	56	66	Calm.	N W	W b N	0·0	10·0	12·4	·066	...	
15	·705	·592	·617	·605	41·4	60·0	47·8	46·4	·191	·283	·300	·258	74	80	91	82	Calm.	Calm.	E	0·0	0·0	3·8	1·142	...	
16	·345	·334	·405	·361	46·3	62·3	48·7	52·4	·309	·435	·307	·350	100	78	91	90	Calm.	N W	E b N	0·0	10·0	8·8	·409	...	
17	·491	·625	·767	·628	47·8	56·0	53·4	52·4	·205	·179	·153	·179	62	41	78	60	W S W	N W	N W	15·2	18·3	10·0	...	...	
18	·881	·800	·745	·810	45·2	65·2	55·8	55·4	·177	·213	·222	·204	60	35	51	49	Calm.	S S W	Calm.	1·0	13·1	0·0	...	...	
19	·728	·580	·499	·602	46·8	73·0	60·8	60·2	·220	·254	·273	·249	70	32	52	51	Calm.	Calm.	Calm.	0·0	0·0	0·0	...	...	
20	·521	·469	·595	·528	43·8	44·2	38·5	42·2	·199		·167		70		72		E b N	E b N	E	34·1	35·9	27·8	...	...	
21	·559	·573	·608	·579	38·2	44·0	42·8	41·7	·142	·180	·211	·178	62	63	77	67	E	E	E b S	12·4	16·9	21·3	...	...	
22	·626	·703	·741	·690	42·3	45·0	41·6	43·0	·186	·202	·222	·203	70	69	85	75	E	E N E	E	22·7	27·8	30·1	...	...	22d. At 6 p.m. velocity of wind 54 miles per hour.
23	·749	·736	·733	·739	41·3	52·1	44·4	45·9	·247	·259	·263	·256	97	67	91	85	E N E	E N E	E N E	16·0	10·0	10·0	...	...	
24	·683	·518	·654	·618	42·3	56·1	51·6	50·0	·266	·297	·217	·260	100	67	58	76	E N E	E N E	Calm.	8·0	2·0	0·0	...	...	
25	·676	·686	·734	·699	46·0	49·2	42·6	45·9	·209	·182	·165	·185	69	52	61	61	Calm.	N W	N W	0·0	13·9	15·2	Inap.	Inap.	*The 20th day is not included in making up the hourly and monthly means of elasticity and humidity.*
26	·651	·676	·740	·669	42·3	49·4	45·9	45·9	·181	·165	·179	·175	68	47	58	58	W S W	N W	N W	10·0	11·2	8·0	...	...	
27	·700	·666	·717	·694	42·7	57·4	55·3	51·8	·155	·157	·191	·161	50	34	44	43	N W	N	N N W	10·0	11·3	3·8	...	...	
28	·828	·839	·900	·856	46·4	55·8	49·0	50·4	·201	·184	·257	·215	65	42	75	61	N N W	E	E N E	2·0	11·3	11·3	...	...	
29	·954	·875	·849	·893	45·0	70·1	56·5	57·2	·226	·231	·251	·137	76	32	57	55	E N E	S	Calm.	16·0	16·5	0·0	...	...	
30	·930	·816	·805	·850	50·1	68·5	50·9	56·5	·276	·351	·312	·313	78	52	85	72	E N E	Calm.	W	7·2	0·0	6·2	...	...	
31	·827	·674	·599	·780	52·0	81·1	70·7	67·9	·296	·374	·387	·352	78	76	53	69	W	W	S S W	2·0	12·4	2·0	...	...	
M	29·738	29·695	29·726	29·7180	43·31	55·77	48·02	49·03	0·204	0·213	0·212	0·210	73	52	72	66				6·84	12·00	8·68	2·113		

Maximum Barometer, 6 a.m. on the 3d	30·005
Minimum Barometer, 2 p.m. on the 16th	·334
Monthly Range	·671
Monthly Mean	29·7180
Maximum Thermometer on the 31st	83°·0
Minimum Thermometer on the 2d	32·0
Monthly Range	51·0
Mean Maximum Thermometer	56·16
Mean Minimum Thermometer	39·94
Mean Daily Range	16 22
Mean Monthly Temperature	49·03
Greatest Daily Range of Thermometer on 19th	29°·7
Least Daily Range of Thermometer on 21st	6°·9
Warmest Day, 31st. Mean Temperature	67·9
Coldest Day, 2nd. Mean Temperature	37·5
Climatic Difference	30·4
Possible to see Aurora on 18 Nights.	
Aurora observed on 14 Nights.	
Total quantity of Rain, 2·113 inches.	
Total quantity of Snow, inap.	
Rain fell on 6 days.	
Snow fell on 1 day.	