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THE CANADIAN JOURNAL.

NEW SERIES.

No. IX.—MAY, 1857.

NOTES OF TRAVEL IN CHINA.

BY JAMES H. MORRIS, M.A.

Read before the Canadian Institute, March 14th, 1857.

A residence of little more than three months in China would not justify me in giving expression to opinions on the polity, government, resources, or commercial interests of a country, whose limits extend over an area of 5,300,000 square miles, and whose population is equal to one-third of the human family. Nevertheless the observations of a recent visitor may not be devoid of interest, now when the peculiar circumstances of our relations with China, naturally direct an unusual amount of attention to that country. I shall accordingly confine my paper to that part of the country which has recently been the scene of the warlike operations of the British fleet; and will endeavour to give some idea of the singular people with whom it has had to contend.

During the existence of the south west monsoon, vessels bound to China by way of the "Cape of Good Hope," generally shape their course for the China Sea through the straits of Sunda; and after one has for many weeks felt the ennui consequent on a long sea voyage, the imagination is apt to paint in supernatural beauty the long anticipated scene. But there are favorite spots where nature exhibits herself decked in such charms as to defy the overcolouring of fancy, and among such are the straits of Sunda.

At the entrance to the straits between the Islands of Java and Suma-

tra, and in close proximity to Java, where various clustering isles adorn the scene, attention is specially attracted by an immense irregularly shaped island named "Princess Island," thickly studded with different kinds of trees which perfectly conceal the soil or naked rock from the view.

The sinuous coast of Java, however, presents a different appearance; craggy cliffs strike upwards, whose rugged faces bear the marks made by the lashing of the surge; high irregular hills in the distance whose sides are begirt with native plants, and whose tops taper to a point and hide themselves in the clouds; a sloping beach of easy access and overhung by outspreading branches which cast a shadow over the water, appearing to invite the stranger to it: far receding bays over whose surface are wafted on the breeze spicy odours from the home of the savage; and an array of cocoa nut trees extending for miles along the strand, and exhibiting from the tops of their slender trunks the tempting fruit: all add to the variety of the scene; while the majestic Banyan stands alone and affords a shady retreat for hundreds of Malays, who there seek amusement, comfort or repose.

Quantities of different species of fruit, consisting of mangustines, oranges, lemons, mangos, pine apples, and vegetables of many kinds; as also live representatives of the mixed inhabitants of the jungle: monkeys, moose deer, red and green parrots, mocking birds, sparrows, &c., are brought by the natives in canoes to passing vessels, and offered for sale.

Passing through this "Eden of the East" in a fortnight, our proximity to our destination was evinced by the appearance of high and naked islands, around which could be seen ill-shapen and odd rigged craft, which were soon recognized to be Chinese fishing boats. Off the "Lema Islands," among which is to be seen the conspicuous peak of Hong-Kong, vessels are boarded by a native pilot. Some of their boats carry foreign flags, (principally English and American,) and others the private flags of different mercantile houses, which are vouchers of the respectability of the parties who carry them. Their boats average about fifteen tons burthen and are seldom manned by less than four men. There is no necessity for a vessel to reduce her speed for these men, unless she is exceeding six or seven knots per hour, for they can always succeed in getting on board. They run down across the ship's bows and bring their boats near enough to the ship, to enable them to reach her chains with a long bamboo pole, by means of which they fasten on a grapple secured to the end of a long rope: This rope they pay out so as to prevent the sudden

impetus which is given to their boat from swamping her, and when she has assumed a tolerable degree of steadiness, the pilot pulls himself up along side and clammers over the sides of the vessel. He presents his credentials for inspection, which generally conclude with an averment that "the bearer is as honest as any Chinaman," and the terms for pilotage being agreed upon, which can invariably be reduced to one half the demand made, a few pieces of junk or salt beef, are thrown over into the pilot's boat, in accordance with the custom of the country, and it is then cast off. The Harbour of Hong-Kong, called Victoria harbour, at all times presents a very happy appearance; it is about five miles in length, and from one to three in width, hemmed in by islands and mountainous lands so as to resemble a small lake. Steamers of war, sloops and frigates, lie at anchor for the protection of the commerce of the countries they represent, and are among the first vessels which the observer distinguishes from the hundreds, including the native craft, each contributing to the variegated scene which the collection of flags presents. One could easily imagine that they were all lying in readiness to bombard the city, on a signal being given, for every sea-going vessel exhibits from her sides an array of mounted guns, many of which are superstitiously decorated by the Chinamen with pieces of red cloth.

The Island of Hong-Kong was ceded to Great Britain at the conclusion of the war with China by a treaty made in 1842, and though heretofore an expensive appendage to the British Crown, it is hoped that ere long it may become a valuable acquisition to her possessions east of the Cape of Good Hope.

Being a free port, vessels going to China on speculation, with or without a cargo, make Hong-Kong their place of destination, as they escape all harbor dues and other expenses which would be imposed on them were they to go to any other port. Sometimes they remain several weeks before they find a market for their commodities, or procure freight for the homeward passage, and this delay entails on them a certain expense by which the colony is benefitted.

The Island is about twenty-five miles in circumference, very mountainous, and yielding very little produce. The city of Victoria is upwards of three miles in length and some of the buildings are large and handsome. The principal public ones are the English Church, Government House and Government Buildings, the Barracks, and Club-houses, which are of granite and expensively furnished. From the commanding position which they occupy, they give the place a solid and wealthy appearance. Many private residences,

extending up the sides of the mountains as far as prudence sanctions, ornament the rear of the city. The streets are wide and well filled with Chinamen, among whom are intermingled people from every quarter of the globe. Some of the gay scarfs and variegated turbans of the Hindoos, as contrasted with the bare shoulders of the natives of the country, add much to the novelty of the picture. The buildings of the tradesmen are of wood, two stories high, the lower part being entirely open and in design reminding one of butchers' stalls. At night closely fitting shutters are put up. The rent of these places being high, if the lessee is not in good circumstances he frequently invites within his narrow limits two or three other tradesmen of different pursuits, who carry on their business independently of each other, but contribute an equal proportion towards the payment of the rent. A portrait painter, a tailor, and a shoemaker form a trio: a copper-smith, a tin-smith and an umbrella maker also affiliate; a hatter and a watchmaker, a haberdasher and a vender of ivory curiosities, and others of equally opposite pursuits are seen working together. As many workmen are required to enable their masters to fulfil their engagements, all of whom are huddled together in this single room, which answers the purposes of workhouse, warehouse and shop: their numbers disincline a customer to go beyond the threshold, but he has such articles brought to the door as he desires to examine with the view of making a purchase.

Between the southern limits of the city and the Barracks, is a large public reserve of several acres which is much frequented by idle Chinamen, who resort thither to while away the day by gambling and sleeping. Peripatetic barbers and itinerant pastry cooks, migratory venders of medicine, and wandering booksellers, strolling fruiterers and roving conjurers, fill up the interval, and the unnatural sounds which some of them bellow forth in recommendation of their articles strike harshly on the ear of the foreigner. Passing along the general thoroughfare will be seen groups of Chinamen, some wearing long blue gowns reaching down to their feet and exhibiting from below a pair of dark cloth shoes, with paper soles of an inch in thickness. One hand is uplifted and holds between the sun and the head of the Chinaman, an open fan or out-spreading umbrella, while the other is engaged in twirling and lashing against his sides, the celebrated queue which is dearer than life itself. The hair is shaven off the head excepting on the crown, from which it is allowed to grow as long as nature will permit it, but the Chinaman above the order of coolies, (which are the lowest and most degraded class in

the Empire,) universally plaited into its heavy skeins of silk, which terminate within two or three inches of the ground. Others dressed only to such an extent as places them without the rigour of the law, and who are styled "coolies," wander about prepared to work if well paid, to steal, which they prefer doing, if an opportunity offers, or to join in any disturbance that may arise. These fellows are watched pretty closely by the police, who treat them with well merited severity when they detect them in the gratification of their unlawful cupidity. When brought before the police magistrate, he enrols them among the chain gang, who make and repair the public roads, and are thus rendered generally useful. This corps is distributed every morning throughout different parts of the town, each detachment being in charge of a policeman who holds a musket over one shoulder, and an open umbrella on the other.

There are several villages in Hong-Kong, and on the adjacent islands, the inhabitants being principally piratical fishermen, who, no doubt act in collusion with the more desperate outlaws who hoist the flag of their profession.

Excursions are constantly made by the police force and volunteers in Hong-Kong, against the piratical fishermen, and when prisoners are taken they are bound together by their queues and led to the prison. Sometimes they are handed over to the authorities at Canton, under whose direction they are decapitated. The population of the whole island is upwards of 45,000; the foreign residents, exclusive of the military, numbering about 300 persons. The floating part of the population in front of the city is large. This class of people exists throughout China, and is a separate race in itself. They are born, marry, and live out their existence, in their shell-like abodes. Many of them procure employment from foreign ships, each one while in the harbor having one or more native boats attached to her. Those generally patronized are about 18 feet in length, and carry sails made of matting. They are entirely decked over with closely fitting boards, and when a passenger presents himself, three or four in the centre of the boat are taken up to make room for his legs, the surrounding portion being neatly matted over and serving as a seat. The cabin into which the legs only are admitted, is floored and matted, the flooring being about two and a half feet from the deck; and resting on the left side of the boat will be seen a little idol sitting in senseless state, and which the occupants of the boat never fail to worship, both in the morning and evening. Every boat throughout the Empire, no matter how small, is provided with its tutelary deity, before which are displayed joss-

sticks, wax tapers, and "chow-chow," or food, which is served up in small dishes, and consists of cold tea, and different species of fruit; but the loss of appetite which this uncomplaining favorite invariably manifests, if not a matter of wonder to its indulgent devotee, is at least an occasion of profit. Over head is a cylindrical frame-work covered with a double matting, the inner one being made of straw, and the outer of split rattan. It protects the inmates of the boat from the tropical sun, or pelting rains which are very frequent.

The cooking takes place in the after part of the boat, each one being provided with a stone or earthenware portable kitchen, which rests between the decks, and is covered over in wet weather, or when the smoke becomes disagreeable to those on board.

The other parts of the boat are used as lockers, store-rooms, or sleeping apartments; in fact, the Chinamen sleep all over the boat, as often on deck as below: a Chinaman's bed consisting merely of a mat and split rattan pillow. Should the night be cold, instead of wrapping themselves up in blankets, they put on one suit of clothes over the other until they feel comfortable. It is a common sight on a chilly day to see a Chinaman with all his wardrobe on at once, and presenting a portly appearance with which nature never endowed him.

The boats carry one or two masts and large sails made of matting, both of which are lowered on deck when they cannot be used.

The oars are composed of two pieces of wood, the blade being bound to the loom by means of cords. At the upper end of the loom is a transverse piece of wood about five inches in length and one in diameter, which is used as a handle, and on which the oarsman can have a good purchase. Instead of row locks, there are pins about fifteen inches in height, generally having a slight curvature in them, and graduated by notches, from one of which a small loop of straw rope is suspended, through which the oar is thrust.

Sometimes the Chinamen sit down on the deck and pull as Europeans do, but their custom is to stand up facing the bow of the boat and work the oar from the shoulder. The women labor as hard as the men, and in nearly every boat will be observed one or more having an infant slung on to her back, which is rocked to sleep by the exertions of its mother.

The appearance of the children is disgusting. No attention is paid to their sanitary condition, and they are allowed to grow up without appreciating the deterative property of water. Their play mates are cockroaches, which although they exceed them in numbers

are less offensive in the sight of a foreigner. Their food, which is called "Chow-Chow," consists of boiled rice, sweet potatoes and greens, as also fish, with which they are generally well supplied. Boiled rice is the standing dish, and it is no uncommon sight to see one person consume amongst other things, from half a gallon to a gallon of rice at one meal. The rice is placed in a pail on the deck and surrounded by the greedy participators, each one having a bowl in his hand which he fills with rice, and when he has arranged the chop-sticks in his fingers, their application commences most vigorously. The bowl is held up to the mouth and the rice is shovelled in until nature demands an intermission of a few seconds to recover respiration. The idea which suggests itself on first seeing them, is that each is trying how much more he can consume than his neighbour, within a certain stipulated time.

Some of the occupants of the poorer description of craft, which slightly resemble the punts used in this country, or as a Chinaman would say "all same, leete more diffilent," are less fastidious in their tastes than those in better circumstances, and will eat anything that can be digested. Hourly they may be seen plucking the hair from a dead rat which has been thrown to them from a foreign ship, or there may be heard the last of what was an animal of the same tribe, singing his farewell song on the frying pan, and sending forth his savoury odour on the breeze.

A peculiar style of boat characterizes each province, though differing immaterially in internal economy; but the reader can form a fair idea of all of them from the foregoing description.

At a distance of 70 miles from Hong-Kong, in a northerly direction is the city of Canton. It lies on the north side of the Pearl River, up which the traveller is conveyed on an European steamer which plies between the two places. This river varies in width from a quarter of a mile to several miles, and though to a certain degree destitute of that natural grandeur which characterizes some of the rivers of America, it is not without its attractions.

It leads into a country where the christian is abhorred; which was five centuries ago as far in advance of European nations in the arts and civilization as they are now her superiors; which until compelled by the British bayonet, refused to recognize England or America as among the civilized countries on the globe, or to admit within her kingdom foreign officials on terms of equality; whose empire has been usurped by a Tartar tribe, the chief of which has ever had the power of nominating his successor, who styles himself the "Viceregent of Heaven upon earth," and who by establishing arbitrary laws which

are rigidly enforced, and by practising deceit, stratagem, and tyranny, governs a people naturally docile, and maintains his supremacy.

About midway between the mouth of the river and Canton, are the "Bogue Forts" which were captured by the British during the war of 1842, and which command such a range that they appear to guard the threshold of the Empire. Here the channel begins to narrow, and the hills rise to a great height on either side. Mounted batteries line the beach, and forts in design not unlike the Greek letter omega, are built in more elevated positions. They were in a state of decay when I saw them, and the few guns which looked from the embrasures were red with rust: but by recent accounts we learn that they have since been repaired, only to be destroyed by the British. At the summit of the hills are square formed watch towers of granite, from which a signal could be given to the ports below when an enemy approaches. An island situated further up the stream and at an angle of 45° with the Forts on shore, is also strongly fortified.

If nature did as much for the security of some enlightened countries as she has done for China, the science and ingenuity of the people would contribute such acquisitions to the natural strength, as would render the place impregnable.

A circumstance is related which happened at the "Bogue Forts," during the war of 1842, truly characteristic of the Chinese: but before mentioning it it is necessary to remark that in every part of China which has been visited by foreigners, the attention of the traveller is early arrested in consequence of the incessant noise which the natives keep up by the clang of gongs, the beating of drums, the shrill notes of the flute, the explosion of packages of fire crackers, and the confusion of tongues; this medley not tending in any degree to impress upon the mind of the unaccustomed hearer, the conviction that the Chinese have a predilection in favor of quiet.

Owing to the severity of the penal code, such a sight as an assault made by one Chinaman on the person of another, is seldom or never seen, but disputes continually take place followed by angry countenances, rapid contortions of the body, and tirades "full of sound and fury," but "signifying nothing."

The commander of the Forts understanding that the British fleet was about to make an attack upon the garrison, sent off an officer in a boat with a letter to the British commander. The interpreter whose dialect will be noticed hereafter, translated it as follows: "These two piecie nation must makey fightie, spose that yankilish

man no put shot in he guns, Chinaman .. out shot in he guns, makey noisey all same!"

At the distance of about ten miles from Canton is the village of Whampoa, where the foreign shipping lies at anchor, the cargoes of the different vessels being brought down to them from the city in native boats. The steamer passes through a long line of frame and bamboo houses built upon piles, and which are rather difficult of access when the tide is on the ebb.

Two celebrated pagodas are among the first objects of attraction, but their design and the object of their erection have been so frequently described by travellers, that further reference to them is unnecessary. The river between Whampoa and Canton is very narrow: on the opposite sides, embankments are thrown up to prevent the river from over flooding the paddy fields. The country on either side is under a high state of cultivation, and in whatever direction one chooses to look, from the mountain top to the valley below, on the face of the hills and over the plains, there cannot be seen one single foot of eligible soil which has escaped the tillage of the industrious Chinaman. The hills and mountain sides when practicable are terraced and prolific with sweet p'tatoes.

When near to Canton the number of native craft begins to increase in the channel, and the pilot stands in the bow of the steamer waving his hand in every direction as a warning to his countrymen to keep out of the way. Accidents occasionally happen which can only be attributed to the temerity or stupidity of the sufferer. The boatmen take their own time to retreat, and sometimes risk running across the bows of the steamer rather than to wait for a few seconds until she passes—happening every trip the steamer makes, it becomes very trying to the temper of the pilot and others belonging to her, who sometimes hurl a well directed missile at the craft which has approached within such an offensive proximity.

The appearance of Canton from the river is very unprepossessing, the foreign factories, the only buildings of any importance having been recently destroyed by fire. While they stood, with the beautiful gardens in front of them, over which were flying the different foreign flags, there was an aspect of comfort characterising at least a portion of the suburbs of the city which existed not within the walls.

No steeples nor domes rise up in the distance, no sloping hills crowned with solid edifices adorn the prospect, no smiling grounds surrounding a happy looking abode lie on the water side, no wide-stretching avenue opens to the view the heart of the city, no wharves

nor esplanades, but one gloomy plain of dark and decaying roofs fills up the space between the river and the mountains. A few forts not meriting a description, a couple of pagodas not particularly elegant, an occasional group of trees, and official poles standing before the residences of a mandarin, and which an author has likened to "dismantled gallows," can be seen from an eminence, but their variety gives but little relief to the sombreness of the picture.

The foreign merchants, (by which I mean the British, French and American,) were confined to a few acres of ground on the river side, which were tastefully laid out and filled with different species of trees and plants.

About one hundred yards from the water were the Hongs, or Factories in which they reside and transact their business. These buildings were three stories high, and presented a long frontage filling up latitudinally the prescribed limits. They extended some distance in depth, it being customary in China to build houses of this description in rear of each other, all being accessible by means of an arched passage which runs underneath them. Between each building, in the rear, was an area of a few feet square. These houses appeared as if built beneath a common roof; it was impossible to avoid the unwilling gaze of a neighbour into the opposite bed room, kitchen or dining room, unless by closing the blinds which would have impeded the free circulation of the air, and have made the matter worse.

The hospitality which strangers receive from foreigners throughout China is proverbial, as all travellers in the country can testify: while in addition to this their acts of generosity to strangers in distress lead one to believe that the old-fashioned virtues of charity and benevolence are not yet extinct, but exist in patriarchial simplicity wherever they are most needed.

In the foreign gardens was a neat Episcopalian Church, a Club House, and a collection of boats equal to those in any other part of the world. The city proper is surrounded by a high wall, within which no foreigner is admitted. The gates are thrown open during the day, and through the archway, a glimpse can be had of the prohibited city. After once passing through a Chinese street there are no inducements to go a second time. There are two in the neighbourhood of the factories occupied by the foreigners, from which strangers usually make their purchases. These are about ten feet in width, and are always crowded with men and women, some having boxes of tea suspended from either end of a bamboo staff which rests on the shoulders; others packages of paper similarly carried.

Starved looking cats, whose melancholy mew betokens their impending fate, are carefully secured in cages, and puppies whose keepers hold them up to the view, are ready for the dainty epicure. Expatriating booksellers, apothecaries vending their drugs to their hypochondriacal customers, and trained birds whose feats astonish the rabble, fill up the interval. This confused mass must be buffeted with, in attempting to pass through a street in Canton.

Signs innumerable, projected from one to three feet from the front of the houses, and suspended lengthwise, are adorned with gaily painted characters, which tell the name of the merchant before whose door they hang. The shops are rather dark inside, but many of them are filled with an excellent assortment of silks, ivory wares, Chinese devices, and foreign importations. The plausibility and naivete of the merchants, and in fact of every Chinaman with whom the stranger comes into contact, are very apt to achieve the purpose for which they are assumed, unless he has been previously fortified against them by one whose experience has been dearly purchased, and who wishes to save a friend from the imposition which would be practised upon him. They are an artful and untruthful race, who by smiles and complimentary addresses invite the passing stranger beneath their roof that they may rob him. They hesitate not to tell an untruth, and blush not at being detected, and the oldest foreign residents in China, freely say that the more respectable the appearance of the man, or exalted his position among his fellow men, the greater is the necessity for doubting his sincerity. No moral principle regulates their action in life, interest alone compels them to perform their agreements with the foreign residents, having been taught that they will not be patronized unless they are upright in their dealings with them. They ask the stranger five times as much for an article as they would be ultimately willing to take for it.

The shopmen, and in fact, nearly all the tankia or boat people in the neighborhood of the foreign gardens, speak a corruption of the English language, commonly called "pigeon English," *pigeon* being the Chinese mode of pronouncing "business."

This language has become a regular dialect, and when first heard by the stranger it would appear as though the person speaking was parading indiscriminately, a few English words before his hearer whose duty it was to make a meaning out of them. A foreign resident will introduce a friend to a Chinese merchant as follows: "mi chin-chin you, this one velly good flin belong mi, mi wantchic you do plopel pigeon along he all same fashion along mi—spose no do plopel

pigeon, mi fin cum down side mi housie, talke mi so fashion mi kick up bobbery along you." To which the Chinaman will reply: "mi savey no casion makey flaid, cau secure do plopel pigeon long you fin all same fashin long you."

Fighting with crickets is a common amusement among the Chinese, and the belligerents can be purchased in small cages. A foreigner wishing to ask for a cricket will say: "mi wantchie makey look, see those two pieces ting makey fightie."—"Haiyah hab got can catechie chop-chop," will be the Chinaman's reply.

This language is as simple as it is absurd, but the words must be arranged as the Chinaman has been accustomed to hear them, or he will not understand what is said. It is spoken in all the ports of China open to foreign trade, and there is no disposition to adopt a purer one. No matter how fluently the China merchant may speak this "pigeon English," he cannot understand anything that is spoken among the foreigners themselves; and this is on the whole fortunate, as remarks are daily made at table about the country and its institutions, which would not be at all gratifying to a mandarin to hear.

The majority of the streets are very narrow, and it would not be a difficult matter for a person to get by one single step from one side to the other. Most of the retired streets are occupied by tradesmen, those of a similar calling keeping together and occupying a whole side of a street. A long row of houses solely occupied by shoemakers, will be seen on one side, and on the other side an equal number of tailoring establishments or trunk makers, all of whom are hard at work. One would fancy that it would be to the interest of all parties were they to distribute themselves throughout the city, but it is to be inferred that they each have patrons who find out their favorite link in the long chain, and visit no other. In many of the streets are to be seen shops containing goods of foreign manufacture, and there are many other indications of the benefits which the Chinese are deriving from foreign intercourse. Ugly looking implements of torture standing in racks, and under the custody of policemen, occupy a position in every street, their disreputable guardians being a greater source of dread to the people than the polished steel itself. The police are poorly paid by the Government, and make up the deficiency by practising enormities upon the people, which dare not be introduced into any civilized country. They are complained of at times by the people, but no heed is given to their petition, unless it is accompanied by a certain amount of money which the sufferer is unwilling and in most instances unable to furnish.

Licensed beggars walk the streets, some of them in a most pitiable condition. This class of the community elects a chief man, who, during his supremacy, is responsible for the misconduct of any of his subjects, and aids the government in detecting any who have infringed the laws of the Empire. They are allowed to frequent all public places and thoroughfares, and would be intolerable, were it not for a custom which exists among the respectable foreign and Chinese houses of paying a monthly sum to the head man, which exempts the donors from the importunities of the vagrants. This is the only method of evading them, and so well disciplined are they, that they seldom approach those whom they have been instructed to avoid.

It is customary amongst the Chinese to have public exhibitions in the streets, which are paid for by private subscription, and which give the people something to talk about for several days. On occasions of this kind the streets are roofed over from one end to the other, and chandeliers and gaily painted lanterns, are suspended from the rafters. Along the sides of the streets are arranged trained plants, some representing a deer and kid, others birds, pagodas, and sundry other devices, all of which indicate the ingenuity of the Chinese.

At either end of the street stages are erected, which are occupied by theatrical performers, tumblers, jugglers, and musicians: hundreds of wax tapers are lighted within the street, and on looking through it from the entrance it has a most dazzling appearance.

On crossing the river between the main land and the island of Honam, (which lies opposite the foreign factories,) at ebb tide ill-shaped looking rocks shoot up in the stream, on which will be seen groups of Chinamen washing, or rather destroying clothes. Instead of using a board or rubbing the linen between their hands, as civilized washerwomen do, these fellows twist the articles into ropes and thrash away on the pointed rocks, each blow taking more than a week's wear out of the garment. When anything requiring particular care is given to them, they beat it between two stones, which soon find their way through it, much to the displeasure of the owner.

Some of the Hongs occupied by the Chinese tea merchants, are substantial brick and stone buildings, and considering their locality, imbedded as they generally are in the centre of a densely inhabited part of the city, are airy and comfortable. They are approached by means of an archway, or warehouse, a door opening from it into the street. These places are used for the stowage of tea, which is brought down from the country. Within these

warehouses are dozens of active Chinamen busily engaged in putting matting on the boxes which are intended for exportation. At the extreme end is the Hong of the merchant, the rooms on the ground floor being used for offices and reception rooms, while those on the upper story are the private apartments of the household. Throughout the private hall up stairs are distributed tables and chairs of a very costly description, the wood work being of a dark colour similar to ebony, very massive and richly carved. On the top of each is inserted a marble slab suitable to the purpose for which it is designed.

On either side of the hall is a row of chairs and small tables alternately arranged, so that each guest when seated has a separate table to himself. A cup of tea is invariably handed to a visitor with the leaves lying in the bottom of it. The cups are very small, and the Chinese drink the infusion without using either sugar or milk. In the rear of the houses, and in some cases in front of them is a flower garden shaded by fruit-bearing trees, beneath which the wife or wives, and children of the Chinaman are permitted to walk. The female portion of the community are never visible. Canton is the capital of the province within which it lies, and being the oldest place in the empire open to foreign trade, people from all quarters of the globe are pushing their fortunes within its precincts.

The natives are treacherous towards foreigners and troublesome to the Government, and the seditious can be seen undergoing punishment in the public streets. For petty offences a man is thrashed through the streets. Men sentenced to wear the cangue, or moving pillory, often fill up the way, and their sorrowful countenances are indices of their suffering. The cangue weighs about fifty pounds, and is composed of heavy planks about four feet square, in the centre of which is a hole large enough to allow the neck to work with ease when this collar is placed on it. The prisoner is allowed to go at large, and is fed solely by the hand of charity. His name and the nature of his offence, are written on the front of the cangue. It is just wide enough to prevent him from lifting his hand to his mouth, to walk is distressing, to lie down impossible, so these poor wretches are worn out by fatigue and end their life by the way side. But the reckless indifference of the Chinese to the value of human life is well known. During the year 1855, upwards of eighty thousand heads were cut off in Canton alone.

Situated at the distance of about sixty miles from Canton in a westerly direction, is the Island of Macao, which is under the res-

pective jurisdiction of the Portuguese and Chinese Governments. Portugal has had a lease of part of the island for the past two centuries, which will continue so long as the yearly rent is paid. In former days, and during the existence of the East India Company's charter, Macao was the head quarters, in China, of that honorable body, and the improvements which they added to the place by the erection of superior buildings and the general adornment of the neighbourhood are still to be seen, but divested of their original attractions. The city lies between two hills, on a peninsula stretching forth from the island, and its breadth is only about a quarter of a mile or very little more; a current of cool air is continually circulating through it, which makes it a place of resort during the hottest months in the year. The Portuguese population is under the direction of a Governor who has a few soldiers allowed to him, to enable him to keep the place in subjection, and prevent the encroachments of the Chinese. A wall is built across the island, the Chinese Mandarin having his residence in the village on one side of it, and the Portuguese Governor his abode on the other. Each has exclusive jurisdiction over his own countrymen, and when a subject of one domain renders himself amenable to the laws of the other, he is transferred to his own Government to undergo his trial and receive his sentence if convicted. On the tops of the hills are extensive forts which perfectly guard the city from attack on any quarter. The buildings erected by the East India Company are located on the south side of the island, at a short distance from the beach, and give the place a pleasing appearance from the water. They give a frontage to the city between the hills, and form an agreeable contrast with the spires and domes which rise up in their rear. Parallel with the beach is a wide level road called the "Praya Grand," at the eastern extremity of which is a park. This is resorted to on Sunday afternoon, by the whole community, to enjoy the delightful music which the military band is generously discoursing, with a view to dispel any gloom that might have arisen during the religious exercises of the morning.

There are two Roman Catholic Churches in Macoa, and as there are no seats in either of them, the female worshippers sit down on the floor, each having brought a small woollen mat, which she throws down on the spot she has selected. The women wear gay muslin or calico dresses, and a cambric shawl which is drawn up over the head in lieu of bonnet.

Nearly all the principal foreign merchants in Canton, have furnished houses in Macao which they visit in hot weather. They are

kept up for the benefit of the young men in their employment, who after a busy season are permitted to take a few days to themselves, which can be more agreeably passed in Macao than elsewhere. So great is the variety of fish in the waters surrounding Macao, that according to the statements of old residents, there is a separate fish for every day in the year.

Since the expiration of the charter of the East India Company, Macao has been gradually declining, but she would have revived during the war between England and China, in 1842, had not a spirit manifested itself which defeated its own object. At that time foreigners were obliged to leave Canton, and take up their abode and transact their business on this island, and all foreign vessels resorted to its harbour. If instead of imposing heavy duties on foreign commodities, and harbour dues upon the shipping, the port had then been free, Macao would not have been obliged to transfer to Hong-Kong, the short lived distinction which circumstances involuntary granted her. Her rulers now feel the weakness of their policy, which evinces its effects in the harbour, the streets, and the buildings. Only native craft disturb her waters, the streets are desolate, and many of the India Company's Hongs are untenanted. Those merchants who have private residences at present, will not retain them after their lease expires, and thus by the short sighted policy of the governing powers of Macao, other islands are destined to outnumber her in population, and exceed her in wealth. Nevertheless, Macao must still be a place of interest to every foreigner, and sacred in the memory of Portugal. Her pure air and solitary retreats were once enjoyed by an exile, who conscious of his wrongs, still restrained the pen of calumny, and painted in immortal verse, the glory of his fatherland. The cave of Camões, in which was composed a portion of the famous *Lusiad*, can be seen on this island; and when the stranger looks upon the cenotaph erected in its centre by order of the country which had exiled him,—calling to remembrance that the mighty spirit of the poet in whose honour it was tardily reared, had perished in the streets of Lisbon, driven forth by hunger, neglect and sorrow; and that no finger can point to the resting place of Portugal's greatest hero; he loses all sympathy for the oppressor in contemplating the sufferings of the victim, and feels that this,—like so many other national tributes to genius,—is rather a memorial of the nation's shame.

ON THE EMPLOYMENT OF THE ELECTRIC TELEGRAPH FOR PREDICTING STORMS.

BY G. T. KINGSTON, M.A.,

PROFESSOR OF METEOROLOGY, UNIVERSITY COLLEGE, AND DIRECTOR OF THE MAGNETIC OBSERVATORY, TORONTO.

Read before the Canadian Institute, 24th January, 1857.

The employment of the Electric Telegraph for transmitting intelligence relative to the Meteorological conditions that prevail at the same instant, over a wide area of country, is an application so obvious, that it is not surprising that it should have occurred to the minds of many. A few years since an arrangement was in existence in England, by which Mr. Glaisher at Greenwich, received by telegraph, daily reports, at a certain hour, of the state of the wind and weather from various localities in England, Ireland, and Belgium, and there is, I believe, a similar system at the present time in operation, with its centre at the Exchange in Liverpool.

The general idea then involved in the present communication is not new; but this circumstance, though it destroys any claim to originality, possesses at least this advantage, that members of the Institute who may be called on either to reject the following suggestions, or to co-operate in carrying them into effect, will take up the matter with minds somewhat prepared for the task, by previous experience and reflection.

Not to occupy time with further preliminary remarks, I shall proceed at once to state briefly the general nature of the scheme that I have to propose.

That the annual loss by shipwreck, of property, (not to say life,) in the American lakes is considerable, there can be no question. The Lake Association of underwriters on the American side, estimated, the loss during the season just closing as over FOUR MILLIONS OF DOLLARS; and it will be found, I have little doubt, that the loss on the British side is proportionably great. It should be remembered further that these losses' whatever they may be, other things remaining the same, will increase with increasing commerce. I have not at command any statistics relative to the loss of shipping on the rivers and sea coasts; nor is it essential that I should produce such; since the general fact without precise numerical data, is a sufficient basis for that which is to follow.

There can be no question but that many shipwrecks would be prevented, if vessels in port had timely notice of a coming gale.

Ships intending to remain would make preparations requisite for withstanding it; and those about to sail would either postpone, or hasten their departure.

Admitting then that wrecks are numerous, and that their number, as well as that of many minor disasters, might be materially diminished if gales were commonly foreseen, I go on to consider the means, *first* of procuring the necessary intelligence; and *secondly* of transmitting that intelligence to the shipping.

On the latter object, the *transmission* namely of intelligence, it is not necessary to dwell, since for this purpose the ordinary machinery of the telegraph is sufficient; and I may therefore confine my attention to the object first named, that of *procuring* the information requisite for the prediction of an approaching storm.

The possibility of doing this depends on the truth of the two following statements, the first of which is certain, and the second highly probable.

1. That gales prevail in some localities often many hours, sometimes two or three days before they reach other places only a few hundred miles distant.

2. That storms in their progress are subject to definite laws, which extended observation will discover.

Assuming the object to be practicable, I propose to effect it by an arrangement of which the following is a rough sketch:

With the concurrence of the telegraph companies, the operator at each of certain specified stations in British North America, should have orders to send immediate notice to the telegraph office at Toronto, of the commencement of a gale at his station. On receiving such a message, the operator at Toronto would call the attention of the Observatory by an alarm, or other contrivance; then repeat the message and connect the observatory wires with those from the various selected stations. The Observatory would then issue orders for hourly or half-hourly returns, or make such occasional enquiries as might be thought expedient.

The information thus collected would supply the data from which to derive a knowledge of the laws that govern the progress of storms, and if these laws were understood, would enable the central office to send notice to the ports along the lake and sea coast, and the various districts through which the storm was about to pass, of the probable time of its arrival, the quarter from which it might be expected, and its approximate duration.

I do not anticipate that the expenses attending such an arrange-

ment would be heavy ; but at any rate I feel certain, that if it were carried into successful operation, the expenses would be covered a thousand fold by the saving to life and property that it would occasion. To enter at present into further details, would I think be premature ; I therefore leave the matter for the Institute either to take up or to reject.

REPORT OF THE COMMITTEE ON PROFESSOR KINGSTON'S PLAN FOR PREDICTING STORMS.

Read before the Canadian Institute, 14th March, 1857.

The Committee of the Council of the Canadian Institute, to whom was referred Professor Kingston's paper on the application of the Electric Telegraph, in giving intimation of storms occurring at different localities, present the following Report :

The Committee consisted of Baron de Rottenburg, Professor Croft, and Professor Cherriman ; in addition to whom they had the assistance of Professor Kingston, and of Mr. Alexander, telegraph operator.

The Committee recommend that Professor Kingston's paper be printed, and a letter be addressed, with a copy of the paper, to the several Boards of Trade and Insurance Offices in the Province, with a view of securing their co-operation in carrying out the objects the Professor has in view ; and suggesting to these bodies the advisability of their entering into some agreement with the several Telegraph Companies, to defray the expenses of forwarding the necessary telegraphic messages from one station to another, and also to the magnetic observatory at Toronto ; and whenever these arrangements shall be completed, that a letter be addressed to the Secretary of the Province, to obtain for the Magnetic Observatory the services of an additional assistant, as a telegraphic operator, and that authority shall also be demanded to defray the expenses of laying down wires from the observatory to the telegraph office.

The telegraph stations which appear to the Committee to be favourably situated for the transmission of notices of storms which may occur in the localities, or for forwarding such notices from other places are as follows, viz :

Halifax, N. S.,
 Riviere du Loup,
 Three Rivers,
 Ottawa City,
 Kingston,
 Toronto,
 Port Dalhousie,
 Port Dover,
 Sarnia,
 Collingwood,

Fredericton, N. B.,
 Quebec,
 Montreal,
 Prescott,
 Cobourg,
 Hamilton,
 Port Colborne,
 Windsor,
 Goderich,
 Barrie.

Availing themselves of the experience of Mr. Alexander, in reference to the probable expense of the necessary telegraphic messages, the Committee are led to believe that this would not exceed £200 annually; and Mr. Alexander suggests, that it would be desirable for the Insurance Companies to insert in policies of Insurance hereafter, a clause obliging captains and owners of vessels to make inquiries at stations, from which their vessels are about to sail, whether any storm is raging at the time in the direction of their course; and that if this was done, and the expenses of such messages or information were paid for by said captains or owners of vessels, it would lessen the expense.

DE ROTTENBURG, Convener.

ON AN OCCULTATION OF SPICA VIRGINIS BY THE MOON.

BY COLONEL BARON DE ROTTENBURG.

Read before the Canadian Institute, 4th April, 1857.

The following brief remarks upon the Planetary appearance of Stars of the 1st and 2nd magnitudes, on the night of the 12th March, 1857, when taken into consideration along with the accompanying notes of independent observations, on the occultation of Spica Virginis by the moon, on the morning of the 13th March, will not, I trust, be deemed unworthy of the attention of the members of the Canadian Institute. The first of these does not indeed possess in itself sufficient importance to warrant its forming the subject of

a particular communication, but when it is regarded in connection with some unusual, though not unprecedented appearances seen in the occultation of the star Spica at the same time, and it is considered that possibly the same optical or atmospheric causes may have exercised more or less influence on both phenomena, I have been induced to bring both matters before the Institute.

With reference to the planetary look of the stars, of the 1st and 2nd magnitude, as observed by me on the night of the 12th March, (a night not easily forgotten, having been that on which the terrible railroad accident occurred at the Desjardins Canal bridge,) I saw that bright star in Lyra, (Vega,) with a disc like the planet Jupiter; this was about one o'clock on the morning of the 13th. I could scarcely believe it was not a new star, so brilliant was its appearance, till I satisfied myself of its identity; I then observed the other stars of the 1st and 2nd magnitudes which were visible, viz. Arcturus, Regulus, Procyon, Castor, Pollux, and Capella; and all of these presented the same marked planetary appearance, with an absence of scintillation, and altogether different from the ordinary look of these stars. The moon was shining bright—being only two days past the full; the night was cold and frosty, but perfectly calm; the stars resembled the appearance they exhibit in the tropics as described by Humboldt, who says, referring such appearances to atmospheric causes: “thus the more equal mixture of the atmospheric strata in and near the tropics, and that faintness or total absence of scintillation of the fixed stars, when they are 12 or 15 degrees above the horizon, give the vault of heaven a peculiar character of mild effulgence and repose. Cumana and the rainless portion of the Peruvian Coast of the Pacific, were peculiarly suited for such observations; on the average, the fixed stars appear only to scintillate when less than 10 degrees above the horizon, at greater elevations they shed a mild planetary light,” &c. And again Humboldt says, quoting another author's remarks, speaking of the climate of Arabia: “the light of the stars is pure, steady, and brilliant; and it is only in the middle of winter that a slight degree of scintillation is observed.” All this, however, is very different from the general look of the starry vault in Canada, where on cold and frosty nights the stars twinkle continually; and where even in summer the planetary look is *wanting*.

Some stars, however, by an inherent property in their light, twinkle more than others. Humboldt says Vega is perhaps one of the stars which twinkles the least; Arcturus and Capella also

generally shine with a very steady light—my own observations induce to the belief, that, Aldebaran is a star, of the 1st magnitude, which does not shine with as steady a light as those I have named above. Now with regard to the planetary appearance of the stars on this occasion, irradiation cannot be overlooked. It is irradiation which causes a luminous body when projected upon a dark ground to appear of increased size, and the reverse of this holds good, viz. : when a dark object is projected on a bright ground, the light encroaches on the dark body, which consequently appears diminished in size ; thus the new moon with the “old moon in her arms,” as it is technically expressed, shows this property of irradiation very decisively, in the projection of the luminous portion of the moon’s disc, beyond the unilluminated part of the moon. Irradiation causes Venus to appear circular when the planet is in the form of a crescent : I speak in these instances of unassisted vision. The telescope under certain powers overcomes the effects of irradiation, and strips both the stars and the moon of this false light. In a transit of Venus or Mercury across the sun’s disc, the true diameters of the planets are diminished by the encroachment of the luminous body of the sun. Irradiation, however, is diminished by the illumination of the ground on which a luminous body is projected. Thus, stars of the 1st magnitude appear to the naked eye of an inferior rank when seen in twilight or by moonlight ; and therefore under ordinary conditions, the stars of the 1st and 2nd magnitudes seen by me on the morning of the 13th March, should have exhibited less intensity of light, and presented less appearance of irradiation in consequence of the bright moonlight, than they would have done if seen on a dark night ; the reverse, however, was the case, for they not only appeared with planetary discs, (if my vision is to be trusted,) but also shone with greater brilliancy, and with a greater absence of scintillation than ordinarily. To what causes are these appearances to be ascribed ?

It is well known that, when stars are viewed with the best telescopes and with high magnifying powers, they present planetary discs, with alternate dark and bright rings surrounding them, but these discs are spurious, caused it is supposed by the diffraction of light. Viewed with low powers and in the finest instruments, stars of the 1st magnitudes appear as mere points of light ; and that they have no sensible discs, is proved by the instantaneous extinction of the light of a star when occulted by the moon. As the night on this occasion was frosty, and the moonlight strong ; the stars according to cus-

tom should have twinkled more than on a summer night, and as I said before, should have appeared with diminished lustre.

In order to satisfy myself whether I was mistaken in my opinion, I wrote to Mr. Chalmers, F.R.A.S., who resides at Barrie, to ascertain whether he had also seen the appearance I have attempted to describe. His reply corroborates what I have said; and also introduces the subject forming the second part of this paper, viz. the occultation of Spica by the moon, which it was my intention to have observed, but which intention I was unavoidably prevented from carrying into effect. I will now submit to the Institute, that portion of Mr. Chalmer's reply which refers to the subject matter of this paper.

Mr. Chalmers says, "I did observe the planetary appearance of one star of the 1st magnitude as you describe, by mere chance. It was a very cold night, the 12th, (at least here,) but I happened to be up late, and before going to bed I had a look at the moon with the naked eye; I then saw that Spica Virginis would be occulted, and I waited up for it. I extract the notes I made at the time: 13th March, 1-2 a. m., mean time, Barrie; Spica Virginis occulted by the moon, the star was actually projected on the moon's disc, as I could distinctly see the edge of our satellite outside the star; the star then disappeared instantaneously, not gradually, but as if it had been extinguished in a moment. The atmosphere was perfectly clear, with a sharp frost; the star did not appear to suffer any diminution of light, and was occulted at the bright edge of the moon;—curious planetary appearance of the star—telescope used three and a half foot, by Dollond—definition excellent. The occultation of Spica as seen at Barrie, being a subject of far greater interest than my own observations on the night in question, I shall proceed at once to offer to the notice of the Institute, some remarks made by eminent authorities on the way in which stars have been seen either to hang as it were upon the moon's disc, be projected on it, or reappear and disappear along the edge of the moon, in occultations.

Arago saw, during a total eclipse of the moon, a star distinctly adhere to the slightly luminous disc of the moon during the conjunction. Humboldt says, those cases in which it has been asserted that a disappearance and reappearance and then a repeated disappearance, have been observed during an occultation, may probably indicate the ingress to have taken place at a part of the moon's edge, which happened to be deformed by mountain declivities and deep chasms. Lardner says: some observers of sufficient weight and authority to command gene-

ral confidence, have occasionally witnessed a phenomenon in occultations, which has hitherto been unexplained. According to them it sometimes happens that after the occulted star has passed behind the limb of the moon, it continues to be seen even for a considerable time, notwithstanding the actual interposition of the body of the moon. If this be not an optical illusion, and if the vertical rays come straight to the observer, they must pass through a deep fissure in the moon.

Mr. Hind observes : some authorities adduce an argument in favor of the presence of a lunar atmosphere, from a curious appearance occasionally noticed, when the moon passes before a star—a phenomenon technically known as an occultation—it most frequently happens that the star disappears instantaneously in coming in contact with the moon's limb, and reappears as suddenly and completely, when emerging from behind her disc. But this is not invariably the case ; it has been remarked that instead of vanishing entirely at the moment of contact, the star is sometimes seen projected on the moon's disc, for several seconds of time, and a similar appearance takes place, (though more rarely,) before the final emerging from the other limb. About twenty years ago, a good deal of interest was excited amongst astronomers in reference to this matter, and some occultations of the bright star Aldebaran, were closely watched at the principal European observatories. The result proved far from conclusive—at the royal observatory, Greenwich, some observers saw nothing unusual either at the immersion or emersion of Aldebaran, the star disappeared and reappeared instantaneously ; others on the contrary, saw it distinctly projected on the moon's disc for a second or two, before being occulted, and these persons even observed with similar instruments, and from the same station.

Instances are on record where a star instead of disappearing finally, when first in contact with the moon's limb, has run along it and reappeared several times, evidently between the mountains on the edge of her disc. On the 7th March, 1794, Professor Koch, saw Aldebaran disappear and reappear three times, about thirty seconds or so intervening between immersion and emersion. Another observation of a similar kind was made by Mr. Rumker, at Hamburg, on the 19th February, 1820 ; a star of 7th magnitude appeared to run with extreme rapidity along the summits of the mountains in the moon's edge, by which it was eclipsed from time to time. This "magnificent spectacle" continued nearly ten minutes, when the star finally vanished.

The above remarks by very eminent observers, fully bear out the occurrence of such phenomena as recorded at Barrie, on the evening in question. To account satisfactorily for all such appearances is another matter. Mr. Hind seems disposed to refer the differences which so many practised observers have exhibited, with regard to the occultation of Aldebaran, to the instruments employed, and to the observers themselves, for a satisfactory explanation of the whole.

The question to be decided on the present occasion, is whether it is probable that the projection of Spica upon the moon's limb, as described by the observer at Barrie, is in any way connected with atmospheric or optical causes, which may have influenced the peculiar appearance of the stars on that night, or rather morning—or whether it is to be ascribed to a lunar atmosphere, to an optical illusion, or to some other cause. On these points I do not presume to offer an opinion; but leave them for the consideration of the members of the Institute, some of whom may be able to give a more satisfactory reply than I can. In conclusion I may observe that this paper contains but a moderate amount of original matter, but if the subject is one deserving attention, the quotations from authors of repute are necessarily frequent and unavoidable for its due consideration.

REVIEWS.

Recherches sur les principes Mathématiques de la Théorie des Richesses, par Augustin Cournot, Recteur de l'Académie et Professeur de la Faculté des Sciences de Grenoble. Paris: Hachette, 1838.

"Whatever is obscure is not French." said Voltaire in allusion to the French language. Since Voltaire's day, the remark may be extended to many other developments of French intellect besides their language. In matters of pure science, whether inductive or analytical, the French justly rank foremost of the age since Newton died, but most especially do they surpass all other nations in the precision and clearness of style with which their writers are in the habit, seemingly instinctive, of presenting their subject for discussion; and in dissecting the most recondite and intricate phenomena, they handle the scalpel with an easy grace which *nos autres* are fain to admire but try to imitate in vain: whatever objections we may

make to the principles, the method, or the conclusions of a French philosopher, we may always be sure that it is our own fault if these objections are founded on a misconception of his meaning. To the French philosophers we owe almost entirely those applications of abstract science to the problems of social organisation, which are already beginning to produce important results: the calculus of probabilities, as given by Laplace, is destined to effect perhaps the greatest social changes that the world has yet seen: still, in that very wide field of research, which we call by the general name of political economy, no mathematician had hitherto ventured to intrude; yet surely no science ever called louder for this aid. Search where we will amid the labyrinth of words which at present is said to constitute our political philosophy, we shall not fail to come across definitions undefined, many-headed ambiguities of terms, confusions of consequence and hypothesis, hardy prognostications of contingencies that never happen, till the exasperated searcher resigns in despair the "talking theory," and submits, sulkily enough, to the "silent practice."

It may fairly be doubted whether our science of political economy has made one real step in advance since the famous treatise of Adam Smith; yet, admirable in itself and wonderful considering the circumstances of its production, as this treatise is, Smith has done little more than clear away obstructions and trace out the foundations of the building which is to be: materials enough were ready at hand, but tools were wanting. As in most other sciences, the first investigators are stopped by failure of modes of expression and forms of calculation; seldom has it happened that a science springs all-armed from the brain of one man as of Newton; yet if Archimedes had possessed the Arabic numerals and the Hindoo algebra, the world would not have waited two thousand years for a Newton; and if Adam Smith had possessed the calculus, we should not at this day be wearied and perplexed with the prolix circumlocution of Ricard, or the refining complications of Mill.

The work cited at the head of this article is the first attempt that we are aware of to submit any part of this subject to formal analysis. Its author is a well known and able French mathematician, and his work is no less remarkable for the novelty of its method and the lucidity of its style, than for the nature of the results which he has obtained, and for which he justly claims the character of scientific deductions. We do not propose in this place to examine the truth of the principles from which he sets out: all that we contend for is that, granting the principles, the conclusions follow inevitably. As the

work has never been translated into English, so far as we are aware, our object will merely be at present to give an outline of the system followed and some of the deduced consequences, paraphrasing, as nearly as may be, the statements of the author himself, and for this purpose we shall let him introduce the "theory of riches," in his own words :

One cannot conceive that men can live any length of time in connection with one another, without practising the exchange of property or services, but there is a wide step between this natural, and, so to speak, instinctive act, and the abstract idea of a *value of exchange* which supposes that the objects to which we assign such a value are *dans le commerce*; that is to say, that we are always able to exchange them for objects of equal value. However, the things to which the condition of commercial relations and civil institutions permit us thus to assign such a value are those which in actual language, we commonly design by the word "riches;" and for the purposes of our theory, we shall identify absolutely the meaning of the word "riches" with that presented by the words "exchangeable values"

* * * * * We must distinguish well between the abstract idea of "riches" or "exchangeable values," (an idea fixed, and in consequence capable of lending itself to rigorous combinations,) from the accessory ideas of utility, rarity, adaptation to the wants or enjoyments of man, which the term "riches" in ordinary language recalls; these ideas are by nature variable and indeterminate, and no scientific theory can be founded on them. The division of economists into sects, and the war carried on between practical men and theorists, arise in great part only from the ambiguity of the word "riches" in common language, and the confusion which has always prevailed between the fixed, determinate, idea of "exchangeable value," and those of "utility" which every one can estimate in his own fashion, because there is no fixed standard of measure to which reference is possible. * * * * *

We must also distinguish between the *relative* changes of value, which are exhibited by the variation of the relative values, from the *absolute* changes of value of one or other of the commodities between which exchange has established relations. * * * In our theory, there exist only *relative* values: to seek for others is to contradict the notion itself of "exchangeable value," which implies necessarily that of a relation between two terms. Moreover, the change effected in such a relation is a relative effect which can and ought to be explained by absolute changes in the terms of this relation. There are no such things as absolute values, but there are certainly absolute movements of rise and fall in values, and the knowledge of the laws which regulate these constitutes the "theory of riches."

Having thus precisely defined the object of his researches, Cournot devotes a chapter or two to the consideration of "money," and establishes some curious relations among the "rates of exchange" of different markets, but we must pass on to where, in search of the principles which shall govern his investigations, he clears his way by an onslaught, too well deserved, on his predecessors in this region. He says :

To lay the foundations of the theory of exchangeable values, we shall not, with the majority of speculative writers, remount to the cradle of the human race; we shall not take in hand to explain either the origin of property, or that of the exchange or division of labour. This all belongs without doubt to the history of man, but has no influence on a theory which can only become applicable at a very advanced stage of civilisation, a stage when (to use the language of geometers) the effect of the *initial circumstances* has entirely ceased.

We shall appeal to but one axiom, or, if you please, we shall employ one hypothesis alone, namely, that every one tries to get for his property or labour the greatest possible value. But in deducing the logical consequences of this principle, we shall attempt to fix, better than has yet been done, the elements or data which observation alone can furnish. Unhappily this fundamental point is that which theorists almost unanimously present to view in a manner, we will not say, false, but absolutely meaningless. "The price of things," say they, with almost one voice, "varies directly as the demand, and inversely as the supply."

Our author then proceeds to shew, that, taken in its strict mathematical meaning, the principle is palpably wrong, but as we do not imagine that the writers who use it, ever meant it to bear such meaning, it is not necessary to follow him here: doubtless, the "variation" spoken of is only a loose way of expressing increase and decrease, without specifying that particular mode which is implied in the technical word "variation." The following is of more importance:

Besides, what are we to understand by the "demand?" It is without doubt not the quantity which is really sold at the demand of buyers, for in that case there would result from the pretended principle the consequence, which is in general absurd, that the dearer a commodity is, the more of it there will be sold. If by "demand," we are to understand only a vague desire to possess the commodity, abstraction being made of the limit of price which each demander implies in his demand, there is scarcely a commodity for which we might not consider the demand as infinite; and if we are to take count of the price at which each demander consents to buy, each provider consents to sell, what means the pretended principle? It is, we repeat, a proposition—not erroneous, but devoid of meaning; and accordingly, all those who have agreed to announce it, have equally agreed not to make any use of it. Let us try to betake ourselves to principles less barren.

We must here condense somewhat. The law of the demand, that is, the relation between the price of a commodity and its sale, (for Cournot justly uses "sale" and "demand" as synonymous, no theory being able to take count of a "demand" not followed by a "sale") is altogether unknown, nor is it likely that experience could furnish data, or analysis supply a formula which should determine and represent it, depending as it does on circumstances so numerous and variable and often of so shadowy a character as to elude the subtlest grasp. All we know of it is, that *in general* the sale or demand of a commodity increases

when the price decreases, and *vice versa*: the qualification "in general" being here introduced to exclude certain classes of commodities, such for instance as articles of curiosity and *vertu*, where a considerable fall in the price might even annihilate the demand altogether: if diamonds could be manufactured as cheaply as glass, no one would buy a diamond ring. Such cases, however, may be neglected in the general theory. The rate of this increase or decrease of the sale, in consequence of the fall or rise of the price, is dependent on the particular commodity, and may be more or less rapid; in most manufactured products, the increase of sale would be more than doubled if the price were to fall one half: in other cases, such as the necessaries of life, fuel, bread, and the like, and in cases where the demand is a necessity to a limited class of consumers, as in workmen's tools, weapons of war, philosophical instruments, there might be a considerable fall in price without the demand being much affected at the time. Although this law of the demand is thus unknown, we are not thereby precluded from reasoning with regard to it, for by well known processes of analysis, properties of a function may be discovered when the function itself is undetermined. If we now consider the gross produce of any particular commodity, that is, the quantity sold multiplied by the price at which it is sold, it is clear that the value of this produce may be made as small as we please by diminishing the price sufficiently, for even if the commodity were given away, the consumption would still be a limited quantity. On the other hand, we can conceive a price so high as to put an end to the sale altogether, so that this gross produce would again vanish; between these two points therefore, there must be some particular price at which this same gross produce will have attained its greatest value possible; up to which point it has been increasing and afterwards begins to diminish—in technical language, it admits of a *maximum* value. This then is the one great lever with which Cournot is going to move the world of economics, and we shall now proceed very briefly to indicate the manner in which he has used it. Clearly, however, we are not able to plunge at once into the thick of the market, and demand that the principle shall be applied immediately to the first commodity we lay hold of; many circumstances must be first considered, and it will be wiser to begin with the simplest case we can conceive, even if it be a wholly imaginary one, and then proceed step by step till we arrive at a stage which may be approximately level with the actual condition of things as we see them around us. Not the least part of the merit of Cournot's treatise consists in his admirably-graduated progress from the simple to the complicated,

the imaginary to the real. Setting out then with the case of an absolute monopoly, where the production of a commodity is entirely in the hands of a single person, the price will be determined by the principle that the *net produce* of the commodity shall be a maximum; by the *net produce* meaning the revenue obtained by the sale, less the cost of production. If the cost of production increase, the price will also be increased, though not necessarily to the same extent, and if this increase of cost be not supported by the producer, but by the consumers or by the agents who convey to the consumers and are reimbursed by them, the commodity will always be enhanced to the consumer, and the net revenue of the producer will be diminished, yet the price paid to the producer may rise or fall according to the varying circumstances of the case. An important distinction here develops itself according as an increase of production is attended by an increase or decrease of the cost of production. In the majority of cases of manufactures the latter state will prevail; for, the larger the establishment, the less in proportion are its expenses. In the products of agriculture and in the working of mines, the contrary may often happen, and even in cases which at first sight have something paradoxical about them; for instance, it is said that the *Times* newspaper has reached such a circulation, that every extension of it diminishes the profits of the proprietors, the actual cost of production of each copy of the paper being less than the price charged for it, and the space devoted to the advertisements, from which the profits are derived, being filled to its utmost extent. Another curious class of cases falls between the above two, namely, those where the cost of production is unaffected, either by the increase or decrease of the production, and the price is consequently the same as if the commodity were produced without cost. For example, the expenses of a bridge which is supported by toll will be sensibly the same whether the passers over are few or many, and of a theatrical performance, whether the boxes are full or empty.

In all this investigation it has been supposed that there is nothing to prevent the producer from producing the amount which is required to give him his *maximum* revenue, nor on the other hand from lowering his price to that required for the same *maximum*. If otherwise, a totally different calculation is called for, which we need not here enter into.

Closely connected with the foregoing, is the theory of taxation, which may be considered as an artificial increase of the cost of production. We need only consider two sorts of taxes, the *direct* and

the *indirect*. The former levied on the net revenue of the producer, whether fixed or sliding, has no effect on the price of the commodity, nor on the quantity produced; neither does it in any way fall on the consumer. Not the less may it be prejudicial to the general welfare: the following remarks of our author are exhaustive:

"This tax, though it does not reach the consumer, may be nevertheless very hurtful to the public interest: not mainly because in restricting the wealth of the producer so taxed, it restrains his means of consumption, and so influences the law of the demand of other commodities, but especially because the portion taken away by the tax on the producer's revenue is commonly used in a way less profitable to the increase of the annual production of the national wealth, and of the well-being of the people, than if it had remained at the disposal of the producer himself. We shall not here examine the effects of this abstraction on the distribution of products, whether natural or manufactured, though doubtless this is the ultimate object of the problems connected with the theory of riches, but we may remark, in harmony with all the authorities, that the tax on the producer's revenue, even if it does not hinder the productive funds from producing as much as they did before the tax was imposed, is an obstacle to the creation of new funds for production, and even, where the tax is a sliding one proportional to the revenue, to the improvement of the existing funds. No one will employ his capital in the creation of new funds for production, or in the improvement of those existing, if, by reason of the tax with which he finds the net return of his capital affected, he no longer obtains the ordinary interest accruing from capitals employed in undertakings of the same kind. It is by closing the openings for employment of labour and industry that such a tax, when excessive, acts in the manner the most disastrous."

Of indirect taxes, we may distinguish the two kinds known as *specific* and *ad valorem*. In the former case, the loss sustained by the producer exceeds of itself the gross profit to the treasury, leaving the loss sustained by the consumers wholly uncompensated. Under this head may also be classed the system of *bounties* or *premiums*, the result being that the gain to the producer which is effected by the bounty, is essentially less than the sacrifice caused by the fall in price produced thereby. With regard to *ad valorem* duties, Cournot establishes a very beautiful and simple formula,* by which a duty of this kind is shewn to be equivalent to a certain increase in the cost of production or transmission of the commodity. Hence such a duty falls the heavier, according as the cost of production is greater. Just as in the *specific* duties, the loss sustained by the producer is greater than the income of the treasury, and that by the consumers is wholly uncompensated.

*If the tax on each unit of the commodity be to its price in the ratio of n to 1, the effect will be the same as if the cost of production were increased in the ratio of $(1-n)$ to 1. Thus if the tax were 12 per cent., the increase of cost which would be equivalent to it would be about 13½ per cent.

From the case of an absolute monopoly in the hands of a single proprietor, we pass to that where two independent proprietors are supplying the same market. Each of these will endeavour to render his own net-revenue the greatest possible. If the two proprietors are in precisely similar circumstances, so that the sale by each is the same, then follows the curious result that the revenue derived according to the foregoing principle is less than that which would have been derived if the two sources had been united into one, or if the two had entered into partnership.

“How happens it then that producers, for lack of understanding, fail to stop, as in the case of monopoly or partnership, at the price which in effect gives them the greatest revenue? The reason is, that if one producer had fixed his production in accordance with such a condition, the other might with a momentary benefit carry *his* production to a higher or lower level: certainly, he would soon be punished for his mistake, because he would force the first to adopt a new level of production which would in return re-act unfavourably upon himself. But these successive reactions, far from bringing the two back to their original state, will make them deviate more and more widely from it. In other words, the state supposed will not be one of *stable equilibrium*; and although the most favourable for the producers, it will not be able to exist except by a formal compact between them, because we cannot suppose in the moral world men exempt from mistakes and inconsiderateness, any more than in physical nature we find bodies perfectly rigid, points of support absolutely fixed, and the like.”

The same reasoning holds when the number of independent producers is more than two; the effect of the competition in all cases being to lower the price, a result which indeed we might well have asserted *a priori*, but which has here for the first time received from our author its logical exposition as a scientific fact. The most important, and the most common of this class of cases, is where the concurrence of producers is so great, that any partial production might be cut off without sensibly affecting the whole production or the price of the commodity: here then the effect of monopoly is entirely extinguished, and the benefits of this are not less felt by the public than by our mathematician, whose calculus is wonderfully simplified in consequence. The same principle still governs the price; an increase in the cost of production, including the case of a specific duty, always raises the price, but to an extent which is in all cases less than the increase of cost; and any additional expenses incurred by the commodity after it has left the hands of the producers will lessen the price obtained by them. The loss sustained by the producers, by reason of the imposition of a specific duty, is less, while that sustained by the consumers is of itself greater, than the produce of the tax. Duties *ad valorem* follow precisely the same rule as in the case of a monopoly.

Hitherto, we have considered the commodity discussed to be a simple one—that is—one in which only one class of producers has been concerned: commodities of this kind do not, however, form the majority of ordinary products: we cannot do better than let Cournot himself speak, in introducing this important distinction:

“Very few substances are consumed in the state in which they issue from the hands of their first producer: generally one and the same substance enters into the composition of many different products that are more directly appropriated to consumption; and reciprocally, many primitive substances concur in the formation of each of these products. It is clear that each producer of primitive substances, ought to try to make the most of his property; and then we ought to investigate according to what laws are divided, among the different producers, the profits which they together make by virtue of the law of consumption of the ultimate products. This short *exposé* will be enough to render intelligible what we understand by the effect of the *concours* of producers of different commodities, an effect which must not be confounded with that of the *concurrency* of producers of the same commodity, which has already been discussed.”

In fact, we arrive at a result precisely the opposite in this case of what we had in the former. The effect of competition among *concurrent* producers of the same commodity, was to lower the price: here the effect is to raise the price, and the division of proprietaries acts disadvantageously, not only for themselves, but the public; this disadvantage also being increased in proportion as the number of primitive substances concerned in the production of the compound commodity is greater. When an increase takes place in the cost of production of one of the primitive substances, or when a tax is imposed on it, the price of this one and of the compound commodity will be raised, and at the same time the prices of the other concurrent substances will be lowered, but the rise of price will be less than the assumed increase of cost or the tax. If a tax be imposed on the compound commodity, it will cause the price of each of its components to fall, while that of the commodity itself will be raised, but to an amount which is less than the tax. These results are of a very remarkable character, and, though established by a somewhat intricate calculus, there seems no reason to deny them the character which our author claims for them of possessing all the certainty of mathematical theorems.

The remaining portion of the work under review, is taken up with an examination of the sources from which the wealth of each nation is derived, and the effect produced thereon by the communication of markets. Our limits do not permit us to follow him through these investigations, and indeed, this part of his work is to us the least satisfactory of the whole. The analysis employed is not powerful

enough for the work, and our author is compelled to descend from his vantage-ground of rigorous scientific research, and enter into contest with the "écrivains économiques," in that very arena of wordiness for which he has so justly reproached them. In some places also his reasoning may with justice be impugned, and we have therefore less compunction at cutting short our abstract. Enough has been said to give our readers an idea of the nature of this admirable treatise, and of the style of research pursued, and results obtained in it: we think it may truly be regarded as the first attempt, and a successful one, at founding a true science of wealth on the only base of observation and induction: we must, however, not forget, that the "theory of riches" is only one portion of the social economic field: the true *weal* of a nation depends, not merely on its wealth but infinitely more, on the mode in which that wealth is distributed, and the investigation of the "how and why" for this case must be the ultimate aim of all the problems of civil polity: we would recommend to the attention of our readers, the following eloquent and consoling remarks, with which Cournot closes his book:

We must remember that questions such as these, are not resolved by the argumentations of doctors, nor even by the wisdom of statesmen. A superior power forces nations into this or the other track, and when a system has had its day, sound reasoning will be as unavailing as sophistry, to restore to it the life it has lost. The craft of the statesman consists then in moderating the ardour of the spirit of innovation, without trying to maintain an impossible struggle against the laws of Providence. The possession of a sound theory can aid this labour of resistance to abrupt changes, and helps in facilitating the transition from one *régime* to another; by bringing more lights to the point in dispute, it extinguishes the passions that are in combat. Systems have their fanatics; science, which succeeds to systems, never has. Lastly, if the theories connected with the organisation of society, do not rule contemporaneous facts, they at least render plain the history of facts accomplished. We may up to a certain point, compare the influence of theories of polity on society with that of theories of grammar on language. Languages are formed without the consent of grammarians, and are corrupted in spite of them; but the labours of these bring day-light to the laws of formation and decay of languages; their rules hasten the period at which a language reaches its perfection, and retard somewhat the invasion of the barbarism and bad taste which corrupt it."

J. B. C.

Account of the U. S. Naval Astronomical Expedition to the Southern Hemisphere, during the years 1849,-50,-51,-52 ; compiled by Lieut. Gilliss, U.S.N., Superintendent of the Expedition. Washington, 1855: 2 vols, quarto.

The Expedition of which the work above named gives a description, was determined on by an act of Congress, in 1848, for the purpose chiefly of enlarging and correcting the catalogue of stars for the southern hemisphere. The station selected for the requisite observations, was Santiago, the capital of Chile, which from its geographical position, and the purity of its atmosphere, was admirably adapted for effecting the proposed objects. Lieut. Gilliss was directed, in addition to his astronomical labors, to collect materials for the advancement of the sciences of magnetism and meteorology, together with information relative to the natural history, the topography, and the political, social and commercial condition of Chili, and the contiguous countries.

It is with such miscellaneous matter that these volumes are principally filled ; a brief description only of the astronomical work is given at the end of the first volume ; but the astronomical results will appear in additional volumes not yet published. The first volume prepared by the Superintendent, relates chiefly to the countries on the western side of South America. The second volume contains a narrative of two journeys across the Andes and Pampas, made by Lieut. MacRae, U.S.N., the chief assistant, together with some beautifully executed engravings of the specimens of natural history, mineralogy, and Indian antiquities, collected by the officers of the expedition, and accompanied by notices drawn up by scientific men in the United States, eminent in their respective departments.

The writers appear to have spared no pains in collecting materials for their work ; and while due regard has been paid to arrangement, they have succeeded in putting them together in a very pleasing and spirited style. As a book of travels, apart from its scientific character, it deserves certainly to occupy a very high rank.

The nature and extent of the labors in which the officers of the expedition were engaged, may be learned from the brief account given by Lieut. Gilliss, at the close of the first volume :—

During the summer and autumn months succeeding our arrival, there was almost uninterrupted fine weather. From the 10th of December, when the equatoreal was ready for use, night followed night unrivalled in serenity ; and to the close of the first series of observations on the planet Mars, Jan., 31, there were but four unsuited to work. Labour so continuous in a climate as dry almost as an oven, told severely on unacclimated constitutions ; and it was soon perceived

that the principal assistant must be temporarily released, or be broken down, perhaps permanently. The opportunity to send him to Valparaiso for the meridian circle, was therefore a welcome one. Messrs. Hunter and Smith, recorded for me on alternate nights, until the former was disabled by being thrown from a horse. All the aid was then from Mr. Smith; besides which duty, he became wholly charged with the meteorological observations for every third hour, between six, a. m., and midnight. Within the forty-eight working nights embraced between the above dates, nearly 1400 observations of the planet were accumulated; and by the time that this series terminated, the piers for the meridian circle were finally completed, the health of Lieut. MacRae re-established, and we were able to give undivided attention to its erection and adjustment; so that the instrument was ready for use about the middle of February.

But it must not be inferred that our nights from the 31st of January, were passed idly. Observations for approximate place of the circle had commenced some days before, and extra hours of every night were spent in becoming familiar with the details of the superb instrument that Messrs. Pistor and Martins had sent us from Berlin; and thus, by the time its adjustments were perfected, both of us were expert in its manipulation. Beginning within 5° of the south pole, a systematic sweep of the heavens was then commenced in zones or belts, $24'$ wide. Working steadily towards the zenith on successive nights, until compelled to return below again to connect in right ascension, the place of every celestial body that passed across the field of the telescope, to stars of the tenth magnitude, was carefully noted down. The space immediately surrounding the south pole, was swept in one belt of 5° by moving the circle, and each zone overlaps those adjoining both in right ascension and declination. Above the polar belt there are forty-eight others, making in all $24\ 12'$ of declination, within which we obtained 33,600 observations of some 23,000 stars, more than 20,000 of them never previously tabulated. * * * * *

From Oct. 1850, Messrs. MacRae and Phillip had the entire charge of the instrument for zone observations. When an accident to one of the screws compelled the services of both at the same time, until a new one was received from Berlin, I devoted every other night to the examination of the stars in the catalogue of Lacaille, and between the zenith and our upper zone, which had never been reobserved.

* * * * * As may be supposed, the discrepancies between our estimations of the magnitudes of stars, and those of preceding observers were very considerable in a multitude of cases; but we endeavoured to preserve an uniform system, and will reconcile discordances if we can. There were many errors in Lacaille's work, at the Cape of Good Hope, and quite a number of his stars do not exist in the reduced places of the British Association publication; but we were only amazed that he should have been enabled to accomplish so much, and so well, with a telescope only half an inch in diameter, and in the brief space of ten months.

It was a great satisfaction to work with an instrument like ours, but there was almost too much of it. Out of 132 consecutive nights, after the equatorial was mounted, there were only seven cloudy ones! Of necessity, to afford so large a proportion, the air must be exceedingly destitute of moisture, a condition of things favorable to telescopic vision, but not so to eyes employed during prolonged observations.

Much as the expedition succeeded in effecting, the continuous labor of mind and body occasioned by the nature of the work, and the limited number of assistants, together with the trying influences of climate, seem seriously to have interfered with its complete success. Lieut. Gilliss writes :

We were on the further extremity of the continent, and so distant that the words of my earnest appeal for help, grew cold before they reached home ; unmistakeably convincing me before the close of the first autumn, that one of the objects of the expedition could only be partially accomplished. I had hoped the day was not distant, when astronomers would say, the American Navy has mapped the whole heavens. The observatory at Washington, had commenced a catalogue, intended to embrace all the stars that appear at a sufficient height above its horizon. With sufficient force we could easily have tabulated the remainder, and the noble work would have been a monument to the service for all time. But it was not to be. There is a limit to physical exertion under every clime, and we were not less human than our kind. I had only half the requisite number of assistants for an undertaking so laborious ; and, fixing that limit at the utmost bound consonant with the preservation of health and vision, when my own time was occupied in observations of Mars or Venus, until the meridian circle was again in complete order, it was necessarily unused on alternate nights.

But if the success of the expedition was not in every respect commensurate with the ardent aspirations of its zealous and able superintendent, there is one collateral result which will be hailed with satisfaction by all friends of science—the establishment of a national observatory at Santiago. Mr. Gilliss goes on to say :

We had scarcely organized work systematically, before it was intimated to me, from the university, that the government (of Chile,) would probably establish an observatory at our departure, and to this end was desirous to have one of the professors of mathematics, and two of the most advanced and promising students of the National Institute, acquire a knowledge of the instruments. The utility of such an establishment, and the honor it would reflect on the country, had been urged by the Chilean Ambassador at Washington, prior to our departure from the United States ; and it was a source of no little gratification to me, to witness the incipient step promptly taken towards the realization of an object so noble.

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Throughout nearly the three years of our residence at Santiago, the government evinced the most earnest disposition to forward the objects of the expedition, and to extend every possible consideration to its members, officially and personally. To its liberal and enlightened policy on all questions of science, literature, or art, the world is indebted for more than one valuable contribution ; its schools of arts, music, painting, and botany, the elaborate work on its natural and political history, and its geological topographical survey, are all evidences of its generous patronage. The culminating step was yet to be taken ; and there was a time when we had looked forward to this—the establishment of a national observatory at our departure, with something approaching to certainty. * * *

Learning that my observations would cease about the middle of September, Professor Domeyko, then rector of the National Institute, was authorized to say

that the government would be glad to purchase our observatories as they stood. Dr. Charles Moesta, a graduate of the university of Marburg, was appointed director, and was placed in communication with me, so that he could become familiar with his instruments by the time we were ready to surrender them.

On the return to the United States, of the rest of the expedition by the Panama route, Lieut. MacRae was despatched home via Buenos Ayres, across the Andes and Pampas. The chief objects of this journey, were to determine the variation of magnetic intensity dependent on the distance from the earth's centre, to assist Baron Lindenau in his investigations relative to atmospheric refraction, and to collect general information respecting the geography and meteorology of the Andes and Pampas.

The entire journey occupied him about sixty days, of which twelve were employed in observations within the Andes. Accidents having unfortunately occurred to the chronometers, by which discredit might be thrown on the longitudes of his stations, Lieut. MacRae, on his arrival in the United States, volunteered to retrace his steps at his own cost if a new set of instruments were supplied to him. His offer being accepted, he embarked for Buenos Ayres, in August, 1853, crossed the Pampas and Andes to Valparaiso, and finally returned to the United States in March, 1854.

Repo. of both his journeys are given in the second volume, occupying some eighty pages. With respect to his magnetic observations, to which he alludes very briefly, he remarks that he encountered much difficulty in making accurate observations in mountain passes, on account chiefly of local attraction and strong winds; he however, considers their accuracy sufficient to justify the deduction that the intensity diminishes with elevation, by some law as yet unknown.

But to return to the 1st volume. This, the exclusive work of Mr. Gilliss, is the more acceptable, from the fact that previous books, or most of them, respecting Chili, refer to a condition prior to the last quarter of a century, and describes what Chili was, instead of what it is.

In the opening chapter on descriptive geography, and in the following one, on the distribution of industrial resources, the author enters into various details relative to the physical and social causes which have operated in determining the position of the cities, the comparative progress of different districts, and their capacity for further improvement.

In the chapter on earthquakes, we read some vivid descriptions of

these terrific visitations, some derived from national records, others witnessed by the author himself.

Of the former class is the celebrated earthquake of 1835. The description refers chiefly to Concepcion and Talcahuano.

At forty minutes past eleven o'clock, the tremor commenced without noise, its violence gradually increasing during the first half minute, yet not so much as to cause general alarm. Meanwhile the rumble was heard, and at the end of that time, the convulsive motion became so strong, that the whole population fled to open places for safety. Before a minute had elapsed, the awful motion so increased, that people could scarcely stand; and in thirty seconds more, an overpowering shock caused universal destruction. Concepcion was a fourth time in ruins—its people shrieking under the agony of terror and bodily injury; the very ground on which they were prostrated gaping wide with every throb, and the atmosphere almost irrespirable with dust. From the first tremor to the termination of the great shock was two and a half minutes, during the longer portion of which time, none were able to stand unsupported; even animals spreading out their legs to avoid overthrow, and birds taking to the wing.

Simultaneously with the beginning of the convulsion, the water rose about a foot in the river at Concepcion, and in the bay of Talcahuano, without first retiring, swelled up to high-water mark; but the great sea-waves came not for a long time afterward.

An hour and ten minutes had elapsed from the destruction of the town of Talcahuano, which was also destroyed, when,

The sea retired nearly a mile, leaving in the mud vessels that had anchored in from four to six fathoms water. A few minutes after, the first great wave approached in an unbroken wall of water, thirty feet high between the island of Quiriquina, and the western shore of the bay. It broke over everything within that distance of tide level; dashed the ships along like boats; bore one from the stocks where it was nearly ready for launching 200 yards inland; removed 24-pounder cannon some yards and overturned them; and finally, rushed back with such a torrent, that everything moveable not buried under the ruins was carried out to sea. The inhabitants occupied the heights at the back of the town, not less appalled at this display of resistless power than despondent at the ruin it caused them. Ships were again left aground in the bay, until half-past 1, p. m., (i. e. after an interval of one hour,) at which time a second wave was seen rolling through the same channel, with more impetuosity than the first, whirling them about each other as they floated, and was only less destructive in its effects, because there was less to destroy. Twenty minutes later, a third came onward. But this was crested—foaming like the breakers across a dangerous bar during a storm; and as it swept tumultuously along the shores, bearing everything irresistibly before it, the roaring noise was horrible. Quickly retiring, the sea was seen covered with wrecks of houses, furniture, and goods of every character, from the shattered magazines. Apparent exhaustion followed these efforts, for there were no more great waves, though for some hours the sea rose and fell two or three times each hour, and both earth and water trembled.

Several days elapsed before the tide rose to within five feet of the usual marks; and as late as the middle of April, there was still a difference of two feet, indicating an elevation of the coast to that amount—a fact substantiated by beds of dead mussels and limpets. At the same time the island of Santa Maria, 40 miles distant in a S.W., direction, and the southern shore of the neighboring bay of Arauco, were more affected. The former was upheaved an average of nine feet, its north end having been raised two feet more than the south point, whilst the main land S.E., of it was only left six feet above its previous height.

At the same time of the run, and until after the great waves ceased, the water in the bay was quite black, and from the bubbles of air, or gas that escaped was apparently boiling in every direction. It also exhaled a sulphurous smell, and destroyed shoals of fish, whose dead carcasses added to the variety of floating objects. Whilst the waves were coming in, two explosions were seen, one a column of dark smoke, like a tower outside the Island of Quiriquina; the other resembled a huge jet of aqueous vapor, thrown up in the bay of San Vicente, which is separated from that of Talcahuano by a narrow isthmus. At the disappearance of the latter, a whirlpool marked the spot, as though a cavity had been opened into which the sea was pouring. At one place in Talcahuano, and several near Concepcion, the ground swelled like large bubbles, and then bursting, discharged quantities of black and fetid water. * * * *

After describing some examples experienced by himself, he enters somewhat into the theory of earthquakes, and relates a fact showing the extent of a region simultaneously affected by the same shock. By means of the electric telegraph erected between Santiago and Valparaiso, it was ascertained that *these two cities 64 miles apart, had been shaken precisely at the same instant.*

Space does not remain to analyse or comment on the able and lucid remarks of the author on the government of Chile, the condition of its society, and the practices of its church; nor can we do more than call the attention of his readers, to the lively narrative of his visits to various districts in which many similar remarks are embodied. We shall be content to terminate this short notice by quoting from the concluding paragraph of the book, where the writer in language, we think, that speaks well both for head and heart, deprecates the charge to which too many travellers have justly exposed themselves: that namely of abusing the hospitality of their hosts, by betraying their defects. He writes:

Many things may have been told in the preceding pages, apparently ungracious from one who acknowledges so many attentions, so many acts of courtesy, and such valuable assistance; but I claim justification and pardon. These very acts would have inspired lasting regard for the people, even had not nature invested their country with elements to create the strongest interest in its, and their welfare. And first, it is more than difficult for a foreigner to comprehend fully, or to appreciate properly the customs and motives for thought and action, of the nation in whose midst he tarries. He brings the standards of his own land by which to measure them; and though long residence may soften the home character

of his criticism, the impressions of childhood will not be effaced, but like magic ink will appear plainly whenever subjected to certain ordeals. Constant occupation prevented much of the intercourse that would have imparted some of these softening influences; and it may be that I continue scarcely more competent to truly estimate Chile and Chilenos than in 1849. Faithfully, however, has the motto been kept before me "nothing extenuate, nor ought set down in malice." More than this: next to my own, there is neither land nor people for whose prosperity and happiness I feel such earnest desire; none whose advancement I would make such efforts to promote. Will these sentiments give me a right to indicate faults; not as a censor regardless of the pain he inflicts, but as the friend who details errors that they may be the better corrected; the admirer who desires to perfect the object of his esteem? On these grounds I ask the indulgence of friends in Chile praying they will ever believe me grateful for their untiring kindness and hospitality.

G. T. K

The Testimony of the Rocks: By Hugh Miller. Boston: Gould and Lincoln, 1857.

Hugh Miller's melancholy end has naturally stamped upon this work an interest of no ordinary kind. But apart from the adventitious interest with which it is thus surrounded, the intrinsic merit of the work itself, the grandeur of its theme, and its fresh and vigorous thought, garbed in the same picturesque word-painting as of old, may fairly claim for it a high place in the consideration of the thinking world. The "Testimony of the Rocks" consists of a series of lectures having for their primary argument the high antiquity of the globe, in opposition to that narrow view which the great Chalmers declared to be unsupported by the Mosaic Record, and which has long been virtually abandoned by many of our most eminent divines—amongst others, by the present venerable head of the Anglican Church itself. To use our author's words—

It is now exactly fifty years since a clergyman of the Scottish Church, engaged in lecturing at St. Andrews, took occasion in enunciating the various earths of the chemist, to allude to the science, then in its infancy, that specially deals with the rocks and soils which these earths compose. "There is a prejudice," he remarked, "against the speculations of the geologist, which I am anxious to remove. It has been said that they nurture infidel propensities. It has been alleged that geology by referring the origin of the globe to a higher antiquity than is assigned to it by the writings of Moses, undermines our faith in the inspiration of the Bible, and in all the animating prospects of the immortality which it unfolds. This is a false alarm. *The writings of Moses do not fix the antiquity of the globe.*"

The bold lecturer on this occasion,—for it needed no small courage in a divine of

any Established Church to take up, at the beginning of the present century, a position so determined on the geologic side,—was at the time an obscure young man, characterized, in the small circle in which he moved, by the ardor of his temperament and the breadth and originality of his views; but not yet distinguished in the science or literature of his country, and of comparatively little weight in the theological field. He was marked, too, by what his soberer acquaintance deemed eccentricities of thought and conduct. When the opposite view was all but universal, he held and taught that free trade would be not only a general benefit to the people of this country, but would inflict permanent injury on no one class or portion of them; and further, at a time when the streets and lanes of all the great cities of the empire were lighted with oil burnt in lamps, he held that the time was not distant when a carburetted hydrogen gas would be substituted instead; and, on getting his snug parsonage-house repaired, he actually introduced into the walls a system of tubes and pipes for the passage into its various rooms of the gaseous fluid yet to be employed as the illuminating agent. Time and experience have since impressed their stamp on these supposed eccentricities, and shown them to be the sagacious forecastings of a man who saw further and more clearly than his contemporaries; and fame has since blown his name very widely, as one of the most comprehensive and enlightened, and, withal, one of the most thoroughly earnest and sincere, of modern theologians. The bold lecturer of St. Andrews was Dr. Thomas Chalmers,—a divine whose writings are now known wherever the English language is spoken, and whose wonderful eloquence lives in memory as a vanished power, which even his extraordinary writings fail adequately to represent. And in the position which he took up at this early period with respect to geology and the Divine Record, we have yet another instance of the great sagacity of the man, and of his ability of correctly estimating the prevailing weight of the evidence with which, though but partially collected at the time, the geologist was preparing to establish the leading propositions of his science. Even in this late age, when the scientific standing of geology is all but universally recognized, and the vast periods of time which it demands fully conceded, neither geologist nor theologian could, in any new scheme of reconciliation, shape his first proposition more skillfully than it was shaped by Chalmers a full half century ago. It has formed since that time the preliminary proposition of those ornaments of at once Science and the English Church, the present venerable Archbishop of Canterbury, Dr. Bird Sumner, with Doctors Buckland, Conybeare, and Professor Sedgwick; of eminent evangelistic Dissenters too, such as the late Dr. Pye Smith, Dr. John Harris, Dr. Robert Vaughan, Dr. James Hamilton, and the Rev. Mr. Binney,—enlightened and distinguished men, who all came early to the conclusion, with the lecturer of St. Andrews, that “the writings of Moses do not fix the antiquity of the globe.”

With a view to carry out systematically the object of the work, its two preliminary chapters, or lectures, are devoted to a popular review of the Palaeontology of Plants and Animals; in which, amongst other facts, the relative perfectibility of the great typical groups with the geological advent of these, in clearly and forcibly shown. Upon a track so often traversed, little of actual novelty can, of course, be expected; but the singularly felicitous and graphic

manner in which the teachings of modern science are brought in all their force before the reader, may be gathered from the following quotation, extracted from the opening of the second lecture :—

“ Amid the unceasing change and endless variety of Nature there occur certain great radical ideas, that, while they form, if I may so express myself, the groundwork of the change,—the basis of the variety,—admit in themselves of no change or variety whatever. They constitute the eye-enduring tissue on which the ever-changing patterns of creation are inscribed: the patterns are ever varying; the tissue which exhibits them for ever remains the same. In the Animal Kingdom for instance, the prominent ideas have always been uniform. However much the faunas of the geologic periods may have differed from each other, or from the fauna which now exists, in their general aspect and character, they were all, if I may so speak, equally underlaid by the great leading ideas which still constitute the master types of animal life. And these leading ideas are four in number. *First*, there is the *star-like* type of life,—life embodied in a form that, as in the corals, the sea-anemones, the sea-urchins, and the star-fishes, radiates outwards from a centre; *second*, there is the *articulated* type of life,—life embodied in a form composed, as in the worms, crustaceans, and insects, of a series of rings united by their edges, but more or less moveable on each other; *third*, there is the *bilateral* or *molluscan* type of life,—life embodied in a form in which there is a duality of corresponding parts, ranged as in the cuttle-fishes, the clams, and the snails, on the sides of a central axis or plane; and *fourth*, there is the *vertebrate* type of life,—life embodied in a form in which an internal skeleton is built up into two cavities placed the one over the other; the upper for the reception of the nervous centres, cerebral and spinal,—the lower for the lodgment of the respiratory, circulatory, and digestive organs. Such have been the four central ideas of the faunas of every succeeding creation, except perhaps the earliest of all, that of the Lower Silurian System, in which so far as is yet known, only three of the number existed,—the radiated, articulated, and molluscan ideas or types. The Omnipotent Creator, infinite in his resources,—who, in at least the details of his workings, seems never yet to have repeated himself, but, as Lyell well expresses it, breaks when the parents of a species have been moulded, the dye in which they were cast,—manifests himself, in these four great ideas, as the unchanging and unchangeable One. They serve to bind together the present with all the past; and determine the unity of the authorship of a wonderfully complicated design, executed on a groundwork broad as time, and whose scope and bearing are deep as eternity.”

After the two preliminary lectures alluded to above, the theological bearings of Geology in many of its leading questions, are taken up and discussed in several lectures with great fearlessness and power. From the known and sterling piety of their gifted author, combined with his equally recognised position in the scientific world, we regard these portions of Hugh Miller's work as peculiarly valuable in their advocacy of the true claims of geological science. It may be that here and there he fails to establish all his arguments in a thoroughly satisfactory manner, but the failure must be sought for

in the very nature of the questions touched upon. The main arguments however, the broad views of enlightened science as distinguished from bigoted empiricism on the one hand, and from skepticism on the other, are sustained by his close and varied reasoning, to their full. Were it not that the book must necessarily fall sooner or later into the hands of our readers, we should much regret our inability from want of space, to transcribe a few of the glowing pages belonging to this portion of its contents. In the lecture, more especially, entitled "The Mosaic Vision of Creation," we have a sketch of exceeding beauty, portraying the eventful and stupendous changes of the great geological DAYS, on the supposition that these were revealed to Moses in a series of visions. This idea however does not originate with Hugh Miller, as some of his biographers seem to infer. It has been brought prominently forward of late years by various authors, more particularly by the German Theologians. As our author observes, the visions of Milton's Adam when by the agency of the Archangel Michael the future was unveiled before him, may have given rise to this beautiful and by no means improbable conception. "Before the eye of the seer," says Professor Kurtz, of Dorpat, "scene after scene may have been unfolded, until at length, in the seven of them, the course of creation in its main momenta was fully represented." The vivid portraiture in the work before us of these wondrous phases in the ancient history of our world, is too long for quotation; and hence, as a final extract, all that our limited space will allow us to indulge in, we give the following eloquent passage from another lecture:

"Such, so far as the geologist has yet been able to read the records of his science, has been the course of creation, from the first beginnings of vitality upon our planet, until the appearance of man. And very wonderful, surely, has that course been! How strange a procession! Never yet on Egyptian obelisk or Assyrian frieze,—where long lines of figures seem stalking across the granite, each charged with symbol and mystery,—have our Layards or Rawlinsons seen aught so extraordinary as that long procession of Being which, starting out of the blank depths of the by-gone Eternity, is still defiling across the stage, and of which we ourselves form some of the passing figures. Who shall declare the profound meanings with which these geologic hieroglyphics are charged, or indicate the ultimate goal at which the long procession is destined to arrive?

The readings already given, the conclusions already deduced, are as various as the hopes and fears, the habits of thought, and the cast of intellect, of the several interpreters who have set themselves,—some, alas! with but little preparation and very imperfect knowledge,—to declare in their order the details of this marvellous, dream-like vision, and, with the dream, "the interpretation thereof." One class of interpreters may well remind us of the dim-eyed old man,—the genius of unbelief so poetically described by Coleridge,—who, sitting in his cold and dreary

cave, "talked much and vehemently concerning an infinite series of causes and effects, which he explained to be a string of blind men, the last of whom caught hold of the skirt of the one before him, he of the next, and so on, till they were all out of sight, and that they all walked infallibly straight, without making one false step, though all were alike blind." With these must I class those assertors of the development hypothesis who can see in the upward progress of being only the operations of an incomprehending and incomprehensible law, through which, in the course of unreckoned ages, the lower tribes and families have risen into the higher, and inferior into superior natures, and in virtue of which, in short, the animal creation has grown, in at least its nobler specimens, altogether unwittingly, without thought or care on its own part, and without intelligence on the part of the operating law, from irrational to rational, and risen in the scale from the mere promptings of instinct to the highest exercise of reason,—from apes and baboons to Bacons and Newtons. The blind lead the blind;—the unseeing law operates on the unperceiving creatures; and they go, not together into the ditch, but direct onwards, straight as an arrow, and higher and higher at every step.

"Another class look with profound melancholy on that great city of the dead,—the burial place of all that ever lived in the past,—which occupies with its ever-extending pavements of gravestones, and its ever-lengthening streets of tombs and sepulchres, every region opened up by the geologist. They see the onward procession of being as if but tipped with life, and nought but inanimate carcasses all behind,—dead individuals, dead species, dead genera, dead creations,—a universe of death; and ask whether the same annihilation which overtook in turn all the past, shall not our day overtake our own race also, and a time come when men and their works shall have no existence save as stone-pervaded fossils locked up in the rock forever? Nowhere do we find the doubts and fears of this class more admirably portrayed than in the works of perhaps the most thoughtful and suggestive of living poets:—

"Are God and Nature then at strife,
That Nature lends such evil dreams?
So careful of the type she seems,
So careless of the single life;
'So careful of the type!' but no,
From scarp'd cliff and quarried stone,
She cries, 'A thousand types are gone.'
I care for nothing; all shall go:
Thou makest thine appeal to me:
I bring to life, I bring to death:
The spirit does but mean the breath:
I know no more.' And he,—shall he,
Man, her last work, who seemed so fair,
Such splendid purpose in his eyes,
Who rolled the psalm to wintry skies,
And built him fanes of fruitless prayer,
Who trusted God was love indeed,
And love creation's final law,
Though Nature, red in tooth and claw,
With ravine shrieked against his creed,—

Who loved, who suffered countless ills,
 Who battled for the True, the Just,—
 Be blown about the desert dust,
 Or sealed within the iron hills?
 No more!—a monster, then, a dream,
 A discord. Dragons of the prime,
 That tore each other in their slime,
 Were mellow music matched with him.
 O, life, as futile then as frail,—
 O for thy voice to soothe and bless!
 What hope of answer or redress:
 Behind the veil, behind the veil!"

The sagacity of the poet here,—that strange sagacity which seems so nearly akin to the prophetic spirit,—suggests in this noble passage the true reading of the enigma. The appearance of man upon the scene of being constitutes a new era in creation; the operations of a new *instinct* come into play,—that *instinct* which anticipates a life after the grave, and reposes in implicit faith upon a God alike just and good, who is the pledged "rewarder of all who diligently seek Him." And in looking along the long line of being,—ever rising in the scale from higher to yet higher manifestations, or abroad on the lower animals, whom instinct never deceives,—can we hold that man, immeasurably higher in his place and infinitely higher in his hopes and aspirations, than all that ever went before him, should be, notwithstanding, the one grand error in creation,—the one painful worker, in the midst of present trouble, for a state into which he is never to enter,—the befooled expectant of a happy future, which he is never to see? Assuredly no. He who keeps faith with all his humbler creatures,—who gives to even the bee and the dormouse the winter for which they prepare,—will to a certainty not break faith with man,—with man, alike the deputed lord of the present creation, and the chosen heir of all the future. We have been looking abroad on the old geologic burying-grounds, and deciphering the strange inscriptions on their tombs; but there are other burying-grounds, and other tombs.—solitary church-yards among the hills, where the dust of the martyrs lies, and tombs that rise over the ashes of the wise and good; nor are there wanting, on even the monuments of the perished races, frequent hieroglyphics, and symbols of high meaning, which darkly intimate to us, that while *their* burial yards contain but the debris of the past, we are to regard the others as charged with the sown seed of the future."

In conclusion, it should be stated that the value of the explanatory portions of the present work is much increased by the addition of numerous, well-executed engravings. Most of these, however, greet us with a strangely familiar aspect. The greater number appeared originally in a little elementary work in French by Beudant, and in the "Cours de Paléontologie," of Alcide d'Orbigny; but they have done duty since the epoch of their first appearance, in several English and German works; amongst others, oddly enough—when considered in connexion with the present book—in that work of very

opposite tendencies, the "Lehrbuch" of Carl Vogt. We must except however, the illustrations of the last two lectures—"The Fossil Floras of Scotland"—which appear to be original. These lectures: in a scientific point of view the most important in the volume, scarcely belong to the general plan of the work, and hence we have not alluded to them in our review. We trust, however, to give some extracts from them in a future number of the Journal.

E. J. C.

The Canada Educational Directory and Calendar, for 1857-8; containing an account of the Schools, Colleges, and Universities; the Professions; Scientific and Literary Institutions; Decisions of the Courts on School Questions, &c., &c. Edited by Thomas Hodgins, B.A. Toronto: Maclear & Co., 1857.

It is no discreditable or unsatisfactory evidence of the rapid progress which Canada is making in the all-important step of providing for the intellectual growth of the province, that such a work as this can be issued with a reasonable prospect of its success as a trading speculation. The number of those interested in educational questions must be considerable, before such could be the case, and to all such the "Canada Educational Directory" can be confidently recommended. The courses of study and requirements for the various examinations in Schools and Colleges, for Masterships in Common and Grammar Schools, for Degrees in Universities, admission as Students or Barristers-at-Law, Surveyors, &c., are here set forth in an exceedingly convenient and accessible form. Lists are also given of the Office-Bearers, Professors, Teachers, Graduates, &c., with a brief, and on the whole impartial notice of the various constitutions of the very diverse educational institutions of the province. Here and there remarks occur reminding us of the conflicting opinions which prevent a perfect union among all the sincere promoters of a liberal education throughout the province; and one or two notes and comments scarcely correspond with the character of the work; but the editor deserves credit for the general aim at impartiality apparent throughout. In some cases information has been withheld, and in the whole compilation considerable labour must have been incurred to secure the accuracy in minute details, without which the object aimed at in its publication would be defeated.

In addition to the varied contents, thus summarily noticed, there is also a useful department, embracing the principal Scientific and Literary Associations of the province, which already begin to assume a very creditable aspect. Unpretending as this work is, it will be valuable to the historian of Canada, hereafter, when the harvest of this good seed-time is beginning to be reaped. We wish the work all success, and hope to see it established as a regular annual publication, improving yearly with the progress it records.

D. W.

Indigenous Races of the Earth ; or new chapters of Ethnological Inquiry ; including Monographs on special departments of Philology, Iconography, Craniology, Palæontology, Pathology, Archæology, Comparative Geography, and Natural History : contributed by Alfred Maury, Bibliothécaire de l'Institut de France, &c. &c., Francis Pulszky, of Lubocz and Cselyfalva, Fellow of the Hungarian Academy, &c. &c., and J. Aitkin Meigs, M. D., Professor of the Institutes of Medicine in the Philadelphia College of Medicine, &c. &c. ; presenting fresh investigations, documents, and materials. By J. C. Nott, M.D., and Geo. R. Gliddon, authors of "Types of Mankind." Philadelphia : J. B. Lippincott & Co., 1857.

Such is the title, in a greatly condensed form, of the new work by the authors of the "Types of Mankind ;" wherein they have carried out still further even, than in their former joint production, the cooperative system, applied of old so effectively in a very different branch of English literature ; when Shakespeare, Jonson, Beaumont, Fletcher, and Massinger, conjointly produced works which defy the modern critic to apportion to each the product of his gifted pen. No such homogenous character, however, marks the modern literary edifice. Each independent labourer carves his own masonry, inscribes it with his mark, and places it, finished, at the disposal of the master-builder, to be harmonised as chance or fortune shall direct, with the stones that are ready to be built with it into the superstructure. The coherence in fact, is little more than such as pertains to the various independent articles which go to make up a cyclopædia, where absolute concurrence in opinions, or even in statement of facts, is not indispensable ; while the whole makes

a bulky quarto volume, which, as it has just come to hand as these sheets are passing through the press, we can only notice very cursorily. And glancing first at that which comes last in the order of arrangement, the special chapters devoted to the controversial theme of "the Monogenists and Polygenists," or in simple words: the unity, or the diversity of the human race, as the descendants of one, or of several pairs; we cannot but regret the form in which it is here put forth, as calculated only to excite unnecessary prejudices against the whole inquiry. Notwithstanding the vehemence of its offensive and defensive warfare against all who venture to maintain their literal interpretation, in simple faith, of the words of their English Bible, that God 'hath made of one blood all nation of men:' the author himself confesses that whilst according to his present opinions, "the reasonings in favour of the *diversity* view preponderate greatly over those against it, he does not, nevertheless, hold the latter to be, as yet, absolutely proven." Such being the uncertainty even in the mind of the boldest and most aggressive champion in the cause of a diversity of origin for the human race, we feel assured that the great majority of Ethnologists must deplore with us, the premature dragging into the arena of theological controversy of a science which is still in its mere infancy; has its data to accumulate, its first principles to determine, and even a commonly recognized nomenclature and terminology to agree upon; and is therefore totally unprepared to buckle on the armour fitted for offensive warfare. What faith can the simple learner be expected to repose, for example, in arguments based on Egyptian chronology, when no two of its authorities can be got to agree on its dates. Within a brief interval of five years, the era of Menes alone shifted back and forward over a range of variations differing by upwards of two thousand two hundred years. Since then it has shown no greater tendency towards a stable equilibrium. Bunsen, indeed, it would seem, from private information of his most recent views just received, (p. 587,) makes of Menes' Egyptian reign (B.C. 3623,) quite a modern era, and starting with the origin of mankind 20,000 years before Christ (!) he gives us an Arian migration circa B.C. 11,000; an Egyptian Republic, B.C. 10,000; a Theban Hierarchy B.C. 7,231; and an elective monarch extending from the precise date, B.C. 5,413 to the very year in which Menes—the first of us moderns—united Egypt under his single sceptre, exactly 5480 years ago! In some such comprehensive ante-historic eras, Mr. Gliddon fully concurs. "Egypt," he remarks in summing up an ideal

analogy, (p. 557,) "oldest of historical lands, representing, therefore but the 'middle ages,' of mankind's development upon earth, typified by our cosmic man, arrived at one third of the 'three score and ten years' imagined by Hebrew writers to be the average of post-mosaic human longevity, it follows that at the third dynasty, say 5300 years ago, the Egyptians at least, among, very likely, other oriental nations whose annals are lost, had long before passed through their periods of adolescence, childhood, and infancy." Yet the bewildered student who looks in vain for some *terra firma*, pretending not (as even the best educated of scholars or students of natural science may surely be allowed, without charge of unbecoming ignorance,) to judge for himself of Turin papyri, petroglyphic inscriptions, Apis-periods, and disputed dynasties, is not to suppose that he may ask for any definite chronology on which learned Egyptologers are agreed. The very Chevalier Bunsen, whose views are quoted approvingly on p. 587, as newly received, and interesting matter "in support of preceding remarks," is referred to on p. 487, before such new matters had come to hand, in these terms:— which disclose to us the the pregnant fact that even Mr. Gliddon is now reserving his own final decision, till the forthcoming of the long promised "Book of Kings" of Lepsius: "until the appearance of which, I have consistently maintained since 1844, no professed system of Egyptian chronology can, in the very nature of human things, possess solid or durable claims to attention: such as have recently appeared, worthy of respect, being either like M. Brunet de Presle's, a re-examination of the classical sources; or else like Chev. Bunsen's second volume, a labyrinth of arithmetical adjustments, satisfactory to no one but their learned calculator: or again, similar to the useful but very piece meal coverings of a skeleton chronology, by M. Brugsch, who, in the main, agrees with the time-measurements previously laid down by Lepsius; or finally, ingenious attempts at unsettling that which had been generally agreed upon, by Champollionists, through M. Poitevin's attorney-like process of detecting some supposititious flaw in the indictment. For myself, therefore, as before stated, I have no more precise Egyptian chronology to offer than that already sketched in *Types of Mankind*; and having waited some twelve years for Lepsius, it is small hardship to extend one's patience a few months longer."

But what, meanwhile, is the inquiring student to turn to, while waiting till the luminaries of Egyptian chronology shall have made up their minds what is to be believed? There is the Geological

department, with its *fossil* human remains:—*fossil* and *humatile*, to use a new word coined to designate that which has been accidentally deposited in the earth, in contradistinction either to the true fossil, or to purposed sepulture. Here at first sight then, is a startling array of facts:—the Guadalupe skeletons; the cave remains, found along with the *ursus spelæus*, extinct rhinoceros, elephant, &c., at Gard, Torbay, &c.; the Floridian human jaws and foot, “embedded in a conglomerate at least 10,000 years old;” and finally, the celebrated *os innominatum*, found near Natchez, on the Mississippi, below the skeleton of a megalonyx and other extinct quadrupeds. These and other instances quoted more extensively, and we may add more confidently, in the *Types of Mankind*, than in this later work, would seem at first sight to make up for any dubiety arising from the disagreement among Egyptian chronologers. But when the honest inquirer turns here for guidance to the authorities in science, Mantell tells him the Guadalupe skeletons are quite modern; Sedgwick, Buckland, and Hugh Miller, are agreed as to the recentness of the human cave bones; Lyell gives the weight of his testimony against any argument based on the Natchez *os innominatum*; and in fine, the geological argument for palæozoic human remains is sought for in vain in the accredited text books of geological science.

The like argument applies to the Archaeological evidence. The flint implements, pottery, &c., found in British caves, where positive evidences of sepulture entirely remove them from being classed as contemporaneous with the embedded remains of any but the most recent extinct mammals, have even been found accompanied with specimens of art—Roman and other—belonging to the Christian era; and as to M. Boucher de Perthes’: “*Antiquités Celtiques et Antédiluviennes*,” largely built upon in the *Types of Mankind*, pp. 353-372, and here again referred to, with further corroboration from later investigations of Dr. Rigollot: we can only say if the “antediluvian remains of art,” of the latter explorer, are no better than those of the former, they will carry even less conviction to the minds of Archæologists, than the quoted examples of “fossil human remains” appear to have done to Geologists. We got hold of M. Boucher de Perthes’ work years ago, when engaged in investigations which would have made us gladly welcome his conclusions, had his premises been even plausible; and had he not accompanied his enthusiastic descriptions with his honest matter-of-fact illustrations, we should have been sorely puzzled to reject his “*figures et symboles de la période antédiluvienne*,” his “*haches celtique, instrumens en pierre*”

and other specimens of "*industrie primitive*;" but having examined his eighty engraved plates, with hundreds of figured examples, we venture to say that any man may provide himself, blindfold, with equally good evidence of antediluvian and preadamite art, in the first heap of broken stones he stumbles over!

And what, let us now ask, is the position of this science of Ethnology, which undertakes to dictate to all older *ologies*? It is, as we have said, in its veriest infancy. Ethnologists are not as yet agreed upon the simplest common terms. Scarcely two of them can be warranted to mean the same thing when they employ such simple words as *race*, *family*, or *species*; to say nothing of *Arian*, *Touranian*, *Mongolian*, *Berber*, and the like, once more discussed here. The relative importance of philological, physiological, and archæological modes of investigation are so little determined, that the, craniologist slightes the philologer, and the linguist in turn scorns the cranioscopist. Is such then a time for the students of this young and deeply important science to waste their energies in bootless controversies on questions, which, if truth were once established on a commonly recognised scientific basis, would vanish like the mists of dawn, before the sun? Such is the utter want of any conformity in the use of a received terminology, that in this very work, we find the term "*Caucasian*" employed by M. Maury (p. 84,) as equivalent to what he calls "the white race," and again by Dr. Meigs, (pp. 219-257,) confessedly unscientifically, as the most convenient one available under which to group such a miscellany as Norwegians, Fins, Germans, English, Irish Celts, Slaves, Jews, Egyptian Fellahs, Thuggs, &c. Mr. Gliddon again has his own views on it (p. 563,) as a term of mystifying vagueness in Ethnography; or with the Count de Rechberg (p.p. 624, 625,) restores it to the only definite meaning it seems capable of, as "the highest type" among the multiform inhabitants of Mount Caucasus. What the present recognized scientific value of the word is, we defy any one to say. So with "*Pelasgian*"—if possible, a still looser and more debateable term. "Dr. Morton," according to Dr. Meigs, "used the term *Pelasgic* too comprehensively. The Circassians, Armenians, and Persians, should not be placed in this group." In his estimation, however, it appears that, "Ancient Romans, Greeks, Affghans, and Græco-Egyptians," all properly class as *Pelasgic*. Dr. Latham on the contrary, classes both *Persians* and *Affghans* under one "*Persian Stock*;" the modern *Greek* he would agree with Mr. Gliddon in recognizing as, to a great extent, Slavonic. The seemingly

simple term *Roman* again, as included in the so-called *Pelasgic Race*,—what is its value or significance? It does not embrace the Etruscans; does it include Oscans, Umbrians, Sabines, Samnites? Does it apply to all Ancient Italians south of the Tiber, extending even to Magna Græcia? Or is it, after all only a political term, having no precise ethnographic value at all, but making of every Roman legionary a *Roman*, just as we may call, if we please, an Indian sepoy a British soldier? Such, as a specimen, is an analysis of the details of this Pelasgic classification according to recognised authorities. But what does the term itself signify? If we turn to Grote, the one conclusion he is sure about is that the Pelasgi were non-Hellenic; adding somewhat pungently an application of the comment of Herodotus on old Egyptian theories, to those who pretend to be wise above what is written, in this:—that “the man who carries up his story into the invisible world, passes out of the range of criticism!” Turn we again to Latham, and he tells us the Pelasgi were “*perhaps* slavonic;” while Clavier, Larcher, Niebuhr, Müller, and Raoul Rochette, may all be studied for conflicting theories on the meaning of the term here employed as a definite or definable one. In the table where it occurs, it is adopted only for convenience, but it is difficult to imagine a less convenient term than one which is the very symbol of controversy and division of opinion. And, as the seemingly precise name of *Roman* is liable to the utmost ambiguity in the hands of the Ethnographer, so is it in like manner with the significant ethnic term “*Briton*” here employed in its loose non-scientific sense, as applied to the mere occupants of the British Isles; as, on the same pages we find Dr. Thurnam quoted as using that of *Anglo-Saxon* to indicate the clearly defined Germanic race of Pagan colonists of Britain in the centuries immediately succeeding Roman occupation; while when Dr. Morton is referred to, it is found applied to multifarious colonists of the New World: the very first example betraying the unscientific application of the term to one rejoicing in the thoroughly cambro-celtic name of *Gwillym*! In truth, when the American Ethnologist takes leisure to analyse the constituents of his own English-speaking fellow citizens; made up of Celtic: Irish, Scottish, and Welsh, fully as much at least as of Anglo-Saxon: Scot and Englishman; not to mention Gallic, Iberian, Italian, Polish, Hungarian, old Dutch, and modern Germanic continental elements;—still less the hybrid tinges of Red, or Black blood, which constitute the theme of one of the most interest-

ing chapters of this work,—he will take the edge off some of the finest *Anglo-Saxon* figures of speech of American oratory!

We believe the great majority of the students of this, the youngest of all the sciences, will heartily sympathise in the views which have guided Dr. Meigs of Philadelphia, in the treatment of the important department entrusted to him in the preparation of the volume under consideration. "I have confined myself," he remarks, "to a simple statement of facts, carefully and designedly abstaining from the expression of any opinion upon the prematurely, and perhaps in the present state of our knowledge, unwisely mooted questions of the origin and primitive affiliations of man. Not a little study and reflection, incline me to the belief that long years of severe and earnest research are yet necessary, before we can pronounce authoritatively upon those ultimate and perplexing problems of Ethnology." It is because we entirely concur in this opinion; and believe that the elimination of the necessary data on which Ethnological science must be built up, and the final recognition of the important truths which it is destined to establish, can only be retarded, by the diversion of its investigators into premature and bootless fields of polemics, that we have occupied so much space, with what we would otherwise have gladly left unsaid. What better can the Ethnologist hope for than that which has already been experienced by the Geologist; who has had to read in more recent octavos the recantation of his earlier quartos, and to confess on awaking, that, like Alnascar in the Arabian Tales, he had been expending the wealth of a dream in a triumph as baseless. It is facts alone we want at present; carefully, accurately, and unprejudicedly noted facts. These once accumulated, will fall into their order in due time, and the legitimate conclusions they point to, whatever they may be, will carry conviction to all honest seekers after truth, and find no lack of adherents "morally brave enough to avow them."

The "Indigenous Races of the Earth," is a work which embodies the results of much zealous industry and careful research. In one chapter, M. Maury discusses "The distribution and classification of Tongues;" going over ground investigated by Sir Wm. Jones, Jacob Grimm, Humboldt, and later philologists: and placing the important results arrived at in a very concise and agreeable form. Next come the "Iconographic researches on human Races and their Art," by Francis Pulszky: an interesting and comprehensive monogram, admitted by Dr. Nott and Mr. Gliddon into their new volume, with

honest candour, as a correction of previous speculations in a similar line of inquiry. The essay is replete with interest, copiously illustrated, and embodies the fruits of a varied familiarity with ancient works of art, which has been fully appreciated by those who have had the privilege of listening to the lectures delivered by him in England on cognate themes. Nevertheless, in his Ethnological deductions, we see once more how far we are yet from any certain *terra firma*. Who, for example, shall determine the ethnic character of the Etruscans, when he must decide between Niebuhr, Donaldson, Raoul Rochette, Pritchard, Latham, and Pulszky? Here, however, is an accumulation of valuable materials, accompanied with highly suggestive hints as to the mode of using them, by the historical ethnographer, to whom such data will not be the less appreciated, even when he may claim the right to exercise his own judgement in determining their bearing on the general questions to which they are here applied, and the legitimate conclusions which flow from them.

Of Dr. Meigs' paper devoted to "The cranial characteristics of the Races of Men," it is sufficient to say that it is a valuable resumé of the labours of Morton, enlarged by many independent observations; with a cautious and discriminating effort to indicate the legitimate deductions which appear to its author to follow from the facts he has established.

Finally, it only remains for us to notice Dr. Nott's discussion of the important subject of "Acclimation; or the comparative influence of climate, endemic and epidemic diseases, on the races of men." Many of the questions discussed are of the highest interest. The nature and extent of acclimation for example, is curiously illustrated. So also, the effects of race, hybridity, various admixtures of blood, climate, &c., in reference to disease, as set forth from the results of observations extending over a course of twenty years professional experience, cannot but be studied with earnest attention, by all who have learned to appreciate the difficulties which gather around the great ethnological problem. The field of this author's observations, moreover lies in that southern region of this continent where the mingling together of the white, red, and black races, under such peculiar circumstances, affords remarkable facilities for the accumulation of facts of the widest significance and value. Dr. Nott has his own special point of view, and he accordingly discusses those of Pritchard, and others who differ from him, with all the advantage of his practical experience, and command of authenticated personal observations. But besides his own data, he has accumulated much

curious information gathered from various independent sources, and from ancient and modern writers on the subject. Important statistical notes are compared and discussed in all their bearings, and partial deductions of former writers, are corrected by his own more enlarged experience. The conclusions he arrives at have already been set forth in the *Types of Mankind*, and need not now be discussed. The facts of such an observer are valuable contributions to science, independently of all deductions which to him may seem legitimately to flow from them. These are reiterated here in all their comprehensiveness, as conclusions drawn from "the long chain of facts" presented by himself and his collaborateurs in the production of the volume under review.

Such is a hasty glance at some of the varied contents of this new contribution to the science of Ethnology, from what may be specially designated as the American point of view. We have had to choose between a hasty notice of it immediately on its appearance, or a more careful study and discussion of its contents in a future number, when we must have followed, in the wake of other reviewers, and referred to a book probably already in the readers hands. We have preferred the former alternative; as our hasty notice may serve to direct the attention of some of our readers to it at an early date, and so afford them the opportunity of making for themselves such a careful and leisurely study of its varied contributions of its authors, as their merits deserve. We would only add, that the style in which the work has been produced, and the price at which it has been furnished to subscribers, amply justify the statement of the publishers, that monetary considerations have exercised little influence on the pains bestowed by the authors on their various contributions.

D. W.

SCIENTIFIC AND LITERARY NOTES.

GEOLOGY AND MINERALOGY.

CALCAREOUS CONCRETIONS FROM BUCKINGHAM, ENGLAND.

Dr. G. D. Gibb, of Guildford Street, London, has kindly forwarded to the Canadian Institute, a large collection of the peculiar concretionary bodies lately figured and described in the *Illustrated London News*, under the term of "Fossil Marine Vegetable Remains." These bodies occur in large numbers in a deposit of "brick clay" at Tingewick, near Buckingham, and are supposed to have been

derived from the denudation of the chalk beds of the neighbouring cretaceous districts. They appear to have attracted more than ordinary attention, various notices of them having been published by Mr. Stowe of Buckingham, (to whom the Institute is indebted for the specimens forwarded through Dr. Gibb,) the Reverend S. G. Osborne, and others; but concretionary bodies of a more or less similar nature, are well known to be of common occurrence, and frequently to present imitative forms of a very varied character.* As pointed out on their first discovery, by the Reverend Professor Sedgwick, the term "fossil vegetable remains," applied to these concretions, is altogether a misnomer; although the original perishable nuclei, around which the calcareous deposition took place—supposing a nucleus to have been present at all—may very possibly, though not necessarily, have been fucoidal. We quote the following passage from Dr. Gibb's communication, forwarded with the specimens in question:—"The presence of fossil infusoria seen in these specimens, does not necessarily prove them to be organic or marine, because we know very well that such bodies may have become incorporated or introduced from without, during the formation of the bed of clay from the debris of the chalk and other rocks. That such may be the case, I think there cannot be any doubt, and I am supported in this view by my friends Mr. J. W. Salter, Mr. T. Rupert Jones, and others. Mr Salter, moreover, thinks such concretions are the commonest things in nature, and such as might be expected in argillaceous matters containing carbonate of lime. They have assumed a flattened and compressed form, owing probably to pressure from the surface above. I am free to admit, however, that the material forming these concretions, may have become deposited around some marine vegetable remains, in consequence of the rather unusual forms assumed. In beds of clay employed for economic purposes, numerous concretions, [assuming various forms, mostly rounded, are very frequently found by the workmen, especially when the clay contains much calcareous matter. The workmen call them "race," and they consist of quartz-sand, mica more or less decomposed felspar, peroxide of iron, and a large proportion of calcareous particles.† The greater part, if not the whole of the latter, Mr. C. H. Sorby, believes to have been derived from the chalk; for numerous characteristic fragments of the *Foraminifera*, of which that deposit is almost entirely composed, are found in it. He thinks such concretions are formed from a mixture of chalk and fine clay, and that they have become consolidated by the action of carbonic water. Such, I conceive would be also an explanation of the specimens from Tingewick, with the possible exception of a form or shape constituting a nucleus."

COAL FIELDS OF KENTUCKY.

The following remarks on the coal deposits of Kentucky, are extracted from the

* We may mention here, that we have recently placed in the collection of the Canadian Institute, some peculiar, silicious concretions, (hitherto, we believe, unnoticed,) from the Black River Limestone of Lake St. John, near the Indian Village of Rama, north-east of Lake Simcoe, in Canada West. Some of these strikingly resemble bones of various kinds; and they present moreover, an internal cavity, often lined with a druse of minute quartz crystals. Their concretionary character is, however, quite evident. One of the specimens obtained, exhibits on its surface a strongly marked impression of the flat valve of an *Orthis*—probably *O. testudinaria*, or *O. costalis*. It may also be mentioned in connection with this subject, that the *Palaeotrochis* of Emmons, a supposed fossil coral, has lately been shewn by Professor Hall, to be merely a concretionary structure. E. J. C.

† Quarterly Geological Journal, vol. 8, p. 186.

recent Report on the Geology of that State, by Dr. Dale Owen: ' In south-western Kentucky, the whole of eight counties, and a part of four other counties, are embraced in the middle coal field of the Mississippi valley, or the coal field which lies partly in Illinois, partly in Indiana, and partly in Kentucky. In eastern Kentucky, fifteen counties, and a large area of five more counties, are included in the great Appalachian coal field, *i. e.* in the coal region occupying the western slopes of the Alleghany Mountains, and the Cumberland range, situated partly in Pennsylvania, Virginia, Ohio, Tennessee, and those above-mentioned eastern counties of Kentucky."

After describing the boundaries of the south-western coal field, the author continues as follows: "The coal beds included in these counties, (Christian county, Baker county, &c.) naturally divide themselves into Upper and Lower coal measures. These are separated from each other, not only by a prominent sandstone formation, (the so-called Anvil Rock,) but they have been cast off from continuity, immediately on the Ohio River, by an extensive uplift and dislocation of the geological formation which stretches from Gold Hill, on the Illinois side of the Ohio River, across the bed of that stream at Shawneeton, to Bald Hill, in Union County. The Topographical Assistant, (S. S. Lyon,) in his detailed survey of Union County, has traced a continuation of this upheaval in a nearly east and west course through the entire county. Beyond the Valley of Cypress, this disturbed belt has an increased width to the boundary of Henderson County. Beyond this point it has not yet been systematically followed; but the occurrence of disturbances, with a reversal of dip, near the confluence of Pond and Green Rivers, render it probable that it can be traced completely through the coal field. In Kentucky there is no evidence, whatever, that this disturbance occurred prior to the deposition of the coal measures; on the contrary, it has implicated in its movements, not only the sub-carboniferous limestone, and millstone-grit, but also the entire coal formation which lies in conformable dip on either side of the axis." Almost all of the coal beds are stated to occur in connexion with under clays containing *stigmairia*. At least eight workable seams occur in the Upper measures and ten in the Lower, varying in thickness, from about a foot to seven feet. Beds of clay iron ore are likewise abundant.

ZIRCON WITH BASAL PLANES.

The absence of the basal form, is one of the most salient characteristics of zircon crystals. M. Friedel, however, has recently announced* the existence of two small crystals in the collection belonging to the Ecole des Mines, in which this form occurs. These crystals are said to have been brought from Serro-de-Frio in Brazil. They have not been analysed, but their identity with zircon seems to be established by their physical and blow-pipe characters, and by the general correspondence of their angles with the measurements of that mineral. Besides the basal plane, the following forms, were also recognized, *viz.*:—the first or diaxial vertical prism, (placed, however, as a monaxial prism in M. Friedel's figures, in conformity with the system of the French school); the triaxial pyramids or octahedrons P, $\frac{1}{2}$ P (not previously recognized), and 3 P; and the eight-sided pyramid 3P3. The new form denoted by the symbol $\frac{1}{2}$ P, comes out nearest to that notation, but the agreement is by no means close. According to M. Friedel's measurements, P : P (in the

* Annales des Mines, tome IX, p. 620.

crystal in which the new form occurs,) = $125^{\circ} 5'$; making the vertical axis, 0,6082; whilst in the form in question, the same angle is stated to be $149^{\circ} 30'$ which would give 0,2334 for the vertical axis.

CALC-SPAR CRYSTALS FROM SOUTH AFRICA.

The cleavage rhombohedron of Calcareous Spar, in *simple crystals*, is well known to be exceedingly rare. As truly stated by M. Dufrenoy, the simple rhombohedrons often labelled "calc-spar" in collections, belong, in general to Dolomite. The writer of these notes, however, has lately received with other minerals from Namaqualand, in South Africa, several large crystals of calcareous spar, occurring in the simple cleavage form. Most of these crystals are somewhat distorted by elongation, and all are striated on the surface in the direction of a plane at right angles to the vertical axis. They are associated with trap, or trap tufa.

In the dolomite rhombohedrons, the obtuse angle over a polar edge, equals $106^{\circ} 15'$; and the presence of magnesia may be readily detected by dissolving the substance in a few drops of diluted hydrochloric acid—adding a drop of nitric acid, and boiling (to convert any FeO that may be present, into Fe^2O^3)—and precipitating by ammonia and oxalic acid the iron (if present) and the lime. The magnesia can then be thrown down from the filtered solution, by phosphate of soda, and tested with nitrate of cobalt before the blowpipe. If conducted in test-tubes, and on small quantities, the whole process need not occupy more than ten minutes.

The following logarithmic formula (extracted from some notes by the writer, in the Phil. Mag. of August, 1853,) for the determination of the vertical axis in rhombohedrons, may not be unacceptable to some of our readers:—

Let a = half the inclination, as obtained by measurement, over a polar edge; b , the inclination of a rhombohedral face on the vertical axis; and v , the axial length required. Then:

$$\text{Log } \cos b = \text{log } \cos a + 0.0624694 ;$$

$$\text{Log } v = \text{log } \cot b - 10.0624694.$$

E. J. C.

PHYSIOLOGY AND NATURAL HISTORY.

CANADIAN STRIGIDAE.

In communicating the following notes on the Canadian Strigidae, the object is mainly to procure information. Nevertheless, those who have not studied the subject may be interested in learning how many varieties of these curious and remarkable birds frequent the neighbourhood of Toronto; as well as in knowing that a tolerably complete collection of specimens of them have been admirably preserved for the University Museum, by the late Mr. Hadgraft and Mr. Passmore, and cannot but prove attractive to every lover of natural objects. It is not, perhaps, presuming too much to hope that intelligent and scientific gentlemen of this district, on observing what has been already procured will use their endeavours to extend the list and assist in obtaining the few other species still wanting, among the more familiar examples, or any novel or rare forms which may present themselves.

The nocturnal Raptorial birds forming the family of STRIGIDÆ or owls, are divided by Mr. Gray into four sub-families.

The SURNINÆ, or Hawk owls, have the head small in proportion, without tufts, and with the facial disc imperfect above the eyes.

The University Museum possesses *Surnia Ulula*, the hawk owl, a moderate sized species abounding in the fur-countries, and occasionally seen in our district.

Nyctea Nivea, the Snowy owl, a well known and very handsome bird; and one example out of several, we might perhaps hope to obtain, of the genus *Athene passerinoides*, one of the birds popularly confounded under the name of the little owl.

The sub-family BUBONINÆ, have the head broad and somewhat flat, with usually two prominent tufts; the facial disc being imperfect above the eyes.

The most conspicuous example is *Bubo Virginianus*, the great Virginian horned owl, one of the larger sized, of very beautiful and characteristic form. Besides this, we have two species of *Ephialtes*, small owls of interesting character:

Ephialtes Asio, the American Scops eared owl, or little screech owl, and *Ephialtes Nudipes*, the naked footed owl, which latter may probably belong to a different genus.

The sub-family of the SYRNIINÆ, (the name of which comes too near in sound to the first,) has the facial disc complete above, the tuft often absent, and when present, of fewer feathers. It affords us two fine species of *Syrnium*:

Syrnium cinereum, the great cinereous owl, a magnificent bird inhabiting deep woods, abounding in the fur countries, and occasionally visiting this more southern district, of which the University has recently obtained a pair from Mr. Passmore; and,

Syrnium nebulosum, the barred owl, one of the commonest species in our neighbourhood.

There are also in the collection two species of *Otus*:

Otus Wilsoni, the American long eared owl, which has generally been confounded with *Otus vulgaris*, the European long eared owl, but is abundantly distinct, and,

Otus Brachyotus, the short-eared owl, common to both continents.

The remaining sub-family, consists of the STRIGINÆ, Barn owls, a race entirely without tufts, with the facial discs complete, generally of a somewhat triangular figure.

Not to leave the group without illustration, a European specimen of *Strix Flammea*, the common barn owl, or white owl, stands with the others. This species is said to belong to America, as well as Europe, but Audubon, gives reasons for supposing the American form to be distinct, and judging from his fine figure compared with the European bird, there is no doubt that he is right. The American specimens have hitherto been found exclusively in the south, whereas the European bird might rather be expected to inhabit more northern regions. Eleven species of owls now in the University Museum, have been procured around Toronto in a short period, and it may be reasonably hoped that further additions will be contributed to the collection from the same neighbourhood, as well as from other parts of the Province.

The University collection contains in almost every instance, a pair of each species, displaying well the sexual differences in size and plumage.

ETHNOLOGY AND ARCHEOLOGY.

CRANIA OF THE ANCIENT ROMANS.

Among the abstracts of papers in the departments of Ethnology, printed in the Report of the British Association for 1855, is one by Joseph Barnard Davis, M.R.C.S.; F.S.A., on the forms of the Crania of the Ancient Romans, which possesses an interest on various grounds. There is indeed an important element of error, probably not overlooked by the discriminating observer, though unnoticed in the following abstract. It would be contrary to all known facts to assume that Crania found in Roman Cemeteries at the British sites named below, were necessarily those of Romans. In the majority of cases, our information would justify an opposite conclusion. The Roman Legions, were Roman only, politically, not ethnologically. At Eburacum for example, the permanent station of the Sixth Legion, the memorial inscription of Lucius Duccius, proves that he was a native of Gaul; while the inscriptions on tiles found there, pertain both to the sixth, and to the ninth, a Spanish legion. Inscriptions on altars and sepulchral slabs; the *Notitia*; the earlier notices by Tacitus of the Roman forces in Britain &c., all combine to prove that of the ethnological elements introduced into Britain by Roman occupation, we must include Gauls, Germans, Iberians, Greeks of Asia Minor, and even Africans; and indeed so small was the actual Italian element of population, that it would be difficult to over state the chances of an Anglo-Roman Sepulchre containing a representative of any of the conquered provinces of the empire, rather than by an actual Roman. In the special case however, described, and chiefly dwelt upon here, it will be seen that means of identification existed, and receive due consideration. The following is the abstract of Mr. Davis's paper, containing ampler details on a subject previously noticed in the Canadian Journal, (vol. I, p. 76.)

"A numerous series of ancient Roman skulls, derived from three different sources in Italy and from the Roman cemeteries at Eburacum, Londinium, Lindum, and Glevum, has fallen into the hands of the author. As the basis of these observations, he selects the cranium of THEODOBIANUS, a Roman of consequence, who died at Eburacum in his 35th year, and whose inscribed stone sarcophagus was discovered many years ago. The venerable antiquary of Roman York, the Rev. Charles Wellbeloved, has referred him to a Roman family of Nomentum, a town of the Sabini in Italy. His skull is an elegant example of the capacious Roman cranium. It is marked by the squareness of face common to the typical form of the Roman head, the fine prominent nasal bones of aquiline profile, their position being more expressed from the broad nasal processes of the superior maxillæ—the expanded and capacious forehead, of somewhat low elevation, terminating below in a prominence of the supra-nasal region, which distinguishes it from the regular skull of Grecian type. It may be regarded as belonging to the typical section of ancient Roman crania, although not presenting the typical character in so decided a form as others exhibited. It will come under the division of what may be called *platy-cephalic* crania, those distinguished by a horizontal expansion of the vertical region. The diacritical marks which distinguish the crania of the ancient Britons from those of the ancient Romans may be expressed as follows: after remarking that those of the Romans were decidedly the larger, he adds:—The face of the former was rather shorter, more

irregular, deeply marked by muscular impressions, with a frowning supra-nasal and supra orbital prominence; short but abruptly eminent nasal bones, rising suddenly out of the depression at the root of the nose; the forehead narrower, yet rising at about the same angle to nearly an equal elevation. The face of the ancient Roman was slightly longer, fully as wide in all parts, and sensibly wider in the frontal region, and as the angles and condyles of the lower jaw. This increased breadth at the two extremities, with want of elevation of forehead, imparted to the countenance that quadrangular appearance so commonly observed in the statues of ancient Romans of Consular and Imperial times. The calvarium in the typical British skull is marked by particular shortness; that of the ancient Roman viewed vertically is not remarkable for shortness, whilst it preserves a considerable breadth. It is fully half an inch longer than the British, and yet somewhat wider. Commencing in the frontal region, this width extends to the temporal in all its parts, and to the parietal. It is on this feature we are disposed to rest its peculiarity, and to call it *pealty-cephalic*, to express that especially expanded form belonging to it without marked loftiness. Probably ancient British and Roman skulls agree pretty closely in elevation. The well-known peculiarity in the nasal bones of the latter, mostly conjoined with remarkable breadth and elevation of the nasal process of the superior maxillary, is another typical mark.

The author next refers to two selected from several skulls obtained from burials on the Via Appia—to a series derived from the Roman cemetery without the south-western gate of Eburacum in 1852—to others obtained from the Roman Cemetery of Londinium in the Borough, dug up from the 'Roman level' about 16 feet below the present surface. He compares the physical characters of the ancient Romans with those which may still be observed in the modern population of Italy, and infers that 'notwithstanding the vicissitudes of all the ages intervening between the present and imperial times, we have just ground for believing that the indicia of the ancient Roman people are still unextinguished in their descendants.' He concludes by suggesting the inquiry into the degree in which these peculiarities of the Romans may be traced in the people of Britain."

Since this notice of the general subject of Roman Crania, and of the special example from Roman York was read before the British Association, the York Cranium has been figured in the beautiful and valuable work, the "Crania Britannica," now publishing under the joint editorship of Mr. Davis and Dr. Thurnam. We shall have an opportunity of noticing its earlier fasciculi in a future number.

D. W.

CANADIAN INSTITUTE.

FIFTH ORDINARY MEETING.—24th January, 1857.

The Hon. the Chief Justice DRAPER, C. B., President, in the Chair.

The following Gentlemen were elected Members:

GEORGE S. MCKAY, Esq., Toronto.

JAMES H. MORRIS, Esq., Toronto.

Dr. B. H. STAMERS, Toronto.

Dr. WALTER GEIKIE, Toronto.

The following donations were announced, and the thanks of the Institute voted to the Donors :

1. By Henry G. Bohu, Esq., London, England, per A. H. Armour, Esq., ;
 - "Forster's Critical Essays," Vol. 1.
 - "Guizot's History of Civilisation," in three volumes.
 - "Thierry's Norman Conquest," in two volumes.
 - "Michael Angelo and Raphael."
 - "Walton's Complete Angler," by Jesse, Plates.
 - "Masterman Reedy, or the Wreck of the Pacific," by Capt. Murryat.
 - "Blair's Chronological Tables, enlarged and continued." Double volume.
 - "Memoirs of the Duke of Sully, Prime Minister to Henry the Great," in four volumes.
 - "Pliny's Natural History." Vol. 5.
 - "Quintilian's Institutes of Oratory." Vol. 2.
 - "Demosthenes against Midias," &c. (Kennedy.)
 - "Dictionary of Classical Quotations."
 - "The Crystal Palace Company."
 - "Life of George Washington," by Washington Irving. Vol. 3.
2. By Hon. J. M. Brodhead, Washington, per A. H. Armour, Esq., :
 - "Regulations for United States Consular officers."
 - "Report on the Finances (United States), 1855-6."
 - "Commerce and Navigation of the United States for year ending 30th June, 1856."
3. From His Excellency the Governor General, per R. T. Pennefather, Esq. :
 - "Address on the opening of the One Hundred and third Session of the Royal Society of Arts, London; delivered by Col. Sykes, F.R.S., Chairman of the Council, Nov. 19th, 1856." Pamphlet.
 - "Parliamentary List of Council and Officers, and Committees of Reference. Two pamphlets.
4. By Professor H. Y. Hind, M. A. :
 - "A collection of Geological Specimens, consisting of :
 - Trilobite Beds: Utica Slate, Blue Mountains, Collingwood.
 - Graptolite: Red River, Humber, Hudson River Group.
 - Fucoid, from the Hudson River Group. Humber River.
 - Ripple Mark, do.
 - Black River and Bird's eye Limestone, from Lake Couchiching
 - Tracks of Crustacea, Potsdam Sandstone, Beauharnois."

The following papers were then read :

1. By Professor KINGSTON, M. A., :
 - "On the practical application of the Electric Telegraph, for predicting storms."
 On the motion of Colonel Baron de Rottenburg, it was ordered that Professor Kingston's paper be referred to a committee, with a view to bring the matter under the notice of the Government, and that the committee consist of Professors Kingston, Croft, and Cherriman, and the mover.
2. By Professor CHAPMAN :
 - "On some Crystals of Carbonate of Lime, from South Africa."

SIXTH ORDINARY MEETING.—31st January, 1857.

The Hon. the Chief Justice DRAPER, C. B., President, in the Chair.

WILLIAM BENNET RICH, Esq., Goderich, was elected a Member.

The following Donations were announced and the thanks of the Institute voted to the Donors :

1. By the Trustees of the New York State Library :
"Copy of a new Catalogue, and several Pamphlets."
2. By Major F. Wells, Royal Regiment :

A Stone Hammer, picked up in one of the Trenches of Sebastopol, third parallel left attack, about three feet six inches under ground.

Major Wells, by whom this interesting relic was secured while actively engaged in the Siege of Sebastopol, being present, the President conveyed to him the thanks of the Institute for this donation, as a relic of the past, rendered doubly valuable from its constituting also a memorial of the memorable war in the Crimea.

The following paper was then read :

By Professor WILSON L.D. :

"On the antiquity of the use of Narcotics in the Old and New World."

SEVENTH ORDINARY MEETING.—7th February, 1857.

Colonel BARON DE ROTTENBURG, Vice-President, in the Chair.

The following Gentlemen were elected Members :

- Mr. Sheriff TREADWELL, L'Original, C. W.,
ROBERT HEDDLE, Esq., Toronto.
WILLIAM COBB, Esq., Solicitor, Toronto.
RICHARD GRAHAME, Toronto, (Junior Member.)

The following papers were then read :

1. By Professor D. WILSON, LL.D. :

"On the Customs, Usages, and Superstitions of the Old and New World, in relation to Tobacco and other Narcotics."

In illustration of this paper, Mr. Paul Kane exhibited a curious collection of Pipes, and other specimens of American native art, executed and used by the various Indian Tribes of the North West.

2. By Rev. Professor HINCKS, F.L.S., :

"Notes on the Strigidae found in the neighbourhood of Toronto."

Specimens were exhibited from the collection belonging to Toronto University

EIGHTH ORDINARY MEETING.—14th February, 1857.

Professor E. J. CHAPMAN, Vice-President, in the Chair.

The following Donations to the Library were announced, and the thanks of the Institute voted to the Donors :

From A. H. Armour, Esq. :

"Outlines of the Geology of Ohio, by C. W. Whittlesey, with a map.

From the Author :

"Natural History of Vermont, a Lecture by Z. Thompson."

"Preliminary Report on the Geology of Vermont."

The following papers were then read :

1. By JOHN LANGTON, Esq., M. A., :

"On the early French discoveries in North America."

Mr. Langton illustrated his paper with a series of tracings of early French maps, which he presented to the Institute.

Ordered, that the thanks of the Institute be presented to Mr. Langton, for his valuable donation.

2. By Professor CHAPMAN :

"Remarks on the classification and leading characteristics of Palæozoic Corals," illustrated by means of explanatory drawings.

NINTH ORDINARY MEETING.—21st February, 1857.

Prof. E. J. CHAPMAN, Vice-President, in the Chair.

The following Donation for the Library was announced, and the thanks of the Institute voted to the Donor :

From the Hon. J. M. Brodhead, Washington :

"Statistical Report on the Sickness and Mortality in the Army of the United States, from January 1839, to January 1855." 1 vol.

The following Gentleman was elected a Member :

W. R. ABBOT, Esq., Toronto.

The following papers were then read :

1. By P. FREELAND, Esq., :

"On a new construction of the stage of the Microscope."

2. By Prof. KINGSTON, M.A., :

"Report on the Meteorological Observations made during the year 1856."

TENTH ORDINARY MEETING.—28th February, 1857.

Prof. E. J. CHAPMAN, Vice-President, in the Chair.

The following Donations for the Library were announced, and the thanks of the Institute voted to the Donors :

1. From the Hon. J. M. Brodhead, Washington, per A. H. Armour, Esq., Toronto :

"Commercial relations of the United States, with all other Nations." Part I., vol. I.

"United States Naval Astronomical Expedition." Vol. VI.

"Proceedings of the Commission for the Settlement of Claims between the United States and Great Britain."

2. From Ecole des Mines, Paris :

"Annales des Mines. Tome VIII., IX.

On the motion of F. W. Cumberland, Esq., seconded by Rev. W. S. Darling, Dr. S. Stratford, of New Zealand, was proposed as a Corresponding Member.

The following paper was then read by Prof. Croft :

"Notes on the Natural History of New Zealand, by S. Stratford, M.D."

A Donation of illustrative specimens was laid on the table, from Dr. Stratford.

Ordered, that the cordial thanks of the Institute be presented to Dr. Stratford, for his valuable donations, and for the accompanying information in regard to New Zealand.

Colonel Baron de Rottenburg gave notice that the Report of the Committee, to whom was referred the communication of Lieut. Ashe, Royal Navy, relative to the extension of the Astronomical Observatory at Quebec, would be taken up at the next meeting.

MONTHLY METEOROLOGICAL REGISTER AT THE PROVINCIAL MAGNETICAL OBSERVATORY, TORONTO, CANADA WEST, - FEBRUARY, 1887.
 Latitude - 43 deg. 30 A min. North. Longitude - 79 deg. 21 min. West. Elevation above Lake Ontario, 108 feet.

Day	Barom. at temp. of 32°.		Temp. of the Air.			Mean Temp. + or - of the Average		Tens. of Vapour.			Humidity of Air.			Direction of Wind.		Result. Direction.		Direction of Wind.		Rain in inches.		Snow in inches.				
	0 A.M.	2 P.M.	10 P.M.	Mean.	6 A.M.	2 P.M.	10 P.M.	0	2	10	0 A.M.	2 P.M.	10 P.M.	6	2	10	M'N'	10	0 A.M.	2 P.M.	10	Re- suit.	Re- MEN	Re- MEN	Re- MEN	Re- MEN
1	29.437	29.505			7.5	11.8	0	0	0	.046	.061		.69	.77				17.5	17.7	9.5	11.00	11.29				
2	29.675	29.780			2.1	10.8		-20.13		.044	.032	.046		.81	.69			11.2	15.0	0.4	7.51	7.92		Inap		
3	30.005	29.993			2.5	20.2		-6.15		.043	.055	.129	.89	.75				4.1	10.0	5.5	5.40	7.01		2.0		
4	29.485	29.781			3.2	34.6		17.62		.044	.055	.130	.93	.76				0.0	0.0	5.2	6.10	8.61		0.2		
5	29.817	29.642			6.1	34.6		30.03		.043	.055	.173	.99	.71				17.5	12.0	0.0	6.23	7.08		0.750		
6	29.789	29.692			37.8	40.2		41.8		.043	.055	.227	.99	.86				0.0	5.0	4.0	2.39	3.07		0.020		
7	29.578	29.459			35.3	49.6		47.05		.043	.055	.227	.99	.86				2.4	2.4	15.0	8.17	8.75		0.080		
8	29.277	29.055			10.7	27.6		23.65		.043	.055	.227	.99	.87				9.5	21.5	15.5	17.47	19.98		0.036		
9	29.150	29.160			15.4	22.1		21.37		.043	.055	.104	.88	.81				11.0	9.5	23.2	16.25	17.30				
10	29.850	29.327			15.4	6.8		16.55		.043	.055	.104	.88	.81				13.4	27.0	12.0	18.73	20.7		Inap		
11	30.310	30.329			1.5	0.0		4.35		.042	.060	.050	.94	.82				9.5	10.0	4.0	3.48	5.79				
12	30.314	30.113			8.2	22.7		22.18		.043	.055	.160	.94	.82				7.5	10.0	7.5	8.57	11.50				
13	29.024	29.738			30.8	42.5		36.02		.043	.055	.181	.94	.82				15.0	15.5	11.0	9.08	11.50				
14	30.038	29.522			23.8	32.4		31.33		.043	.055	.211	.97	.95				3.2	13.0	4.0	4.76	5.90		0.635		
15	29.508	29.502			10.7	42.5		8.57		.042	.068		.97	.90				3.0	3.0	6.5	0.45	3.35		1.620		
16	29.544	29.544			5.5	41.4		40.95		.042	.068	.226	.98	.97				3.5	3.5	0.2	1.16	1.11		0.210		
17	29.687	29.478			35.3	48.7		44.32		.042	.068	.277	.99	.93				0.0	0.0	6.5	0.45	3.35				
18	29.659	29.702			44.4	41.3		38.02		.042	.068	.208	.97	.93				9.8	11.4	8.6	7.14	8.06		0.115		
19	29.713	29.778			27.4	28.8		28.17		.042	.068	.140	.95	.88				6.0	3.0	0.0	2.47	2.67				
20	29.841	29.625			25.0	28.1		28.93		.042	.068	.117	.97	.93				4.5	14.0	12.4	10.58	14.35		0.070		
21	29.488	29.696			32.0	34.8		31.35		.042	.068	.137	.98	.91				15.0	14.8	1.0	12.48	12.63				
22	29.779	29.680			39.0	34.0		32.13		.042	.068	.101	.99	.95				11.7	4.4	0.0	4.94	5.23				
23	29.484	29.450			33.2	39.3		35.98		.042	.068	.101	.99	.95				11.7	4.4	0.0	4.94	5.23				
24	29.514	29.218			35.3	44.1		42.77		.042	.068	.184	.99	.96				3.2	7.0	10.0	8.15	10.30		0.035		
25	29.435	29.583			31.2	40.0		33.85		.042	.068	.207	.99	.93				12.6	21.2	13.0	17.83	18.31				
26	29.061	29.110			27.4	25.9		27.75		.042	.068	.158	.98	.93				19.8	21.3	13.5	14.42	15.32				
27	29.006	29.768			16.0	25.3		22.72		.042	.068	.113	.99	.92				4.0	3.6	4.0	3.31	9.21				
28	29.410	29.281			17.0	30.8		22.57		.042	.068	.084	.99	.88				7.5	31.0	9.0	11.02	12.22				
29	29.7603	29.7433	29.7074	29.7361	25.28	31.41	28.63	28.53	4.86	.149	.151	.147	.91	.77	.85	.84		9.44	11.38	8.25				9.823	9.050	11.7

REMARKS ON TORONTO METEOROLOGICAL REGISTER FOR FEBRUARY.

Highest Barometer..... 30.861 at 9 p. m., on 10th } Monthly range =
 Lowest Barometer..... 29.162 at 4 p. m., on 24th } 1.209
 Maximum Temperature..... 52.°4 on p. m., on 17th } Monthly range =
 Minimum Temperature..... 5.°9 on p. m. of 2nd } 56.°3
 Mean maximum Temperature..... 35.°60 } Mean daily range =
 Mean minimum Temperature..... 20.°42 } 15.25
 Greatest daily range..... 32.°0 from a. m. of 3rd to a. m. of 4th.
 Least daily range..... 4.0 from p. m. of 22nd to a. m. of 23rd
 Warmest day..... 7th ... Mean temperature..... 47.°08 } Difference = 43.°36.
 Coldest day..... 2nd ... Mean temperature..... 20.°42 } 26.66

Maximum. } Solar..... 68.5° on p. m. 17th } Monthly range =
 Radiation. } Terrestrial..... -14.5° on p. m. 2nd } 83.°9
 Aurora observed on 1 night, viz. 26th.
 Possible to see Aurora on 12 nights; impossible on 16 nights.
 Snowing on 11 days,—depth 11.7 inches; duration of fall 31.3 hours.
 Raining on 11 days,—depth 3.050 inches; duration of fall 73.1 hours.
 Mean of cloudiness = 0.72.
 Most cloudy hour observed, 8 a. m., mean = 0.79; least cloudy hour observed,
 10 p. m., mean, = 0.61.

Sums of the components of the Atmospheric Current, expressed in miles,
 North. South. East. West.
 1643.50 2053.24 1177.46 3594.46
 Resultant direction S. 78° W.; Resultant Velocity 3.68 miles per hour.
 Mean velocity..... 9.82 miles per hour.
 Maximum velocity..... 44.6 miles from 6 to 7 a. m. on the 10th.
 Most windy day..... 10th ... Mean velocity 20.57 miles per hour.
 Least windy day..... 16th ... Mean velocity 1.11 ditto.
 Most windy hour ... 11 p. m. to 1 p. m. ... Mean velocity 12.68 ditto.
 Least windy hour ... 11 p. m. to midnight. Mean velocity 7.84 ditto. } Difference } 4.84 miles.

7th—Halo round the Moon, at 10 p. m.
 9th—Halo round the Moon, from 10 p. m.
 13th—Halo and Corona round the Moon, from 11.30 p. m.
 15th, 16th, and 17th—Very foggy and mild.
 18th—Thunder and Lightning from 9 p. m., (first of the season,) accompanied with
 rain, hail, sleet, and snow.
 24th—Sheet-lightning at 7.35 p. m.
 26th—Faint auroral light from 7 to 8 p. m.
 28th—Halo round the Moon, from 7.15 to 8.30 p. m. Brilliant meteor in W. at 11.40
 p. m., moving horizontally towards the north; tail emitting sparks.

This was the warmest February on our records, having a mean temperature 5.55 above the average of 18 years, 3.1 above the mean temperature of February 1855, and 12.8 above that of February 1856.
 The observed maximum 51.2 was higher than any previously recorded in February.
 The number of days on which rain fell was greater than on any former occasion, and the depth was 1.91 inches above the average. This was the most rainy February on record excepting that of 1812.
 The resultant direction of the wind for February, from 1848 to 1857, inclusive, was N 70° W, and the resultant velocity 2.83 miles per hour.

COMPARATIVE TABLE FOR FEBRUARY.

Year	TEMPERATURE.			RAIN.			SNOW.			WIND.		
	M'n.	Max. from obs'd.	Min. obs'd.	Range.	No. of days.	Inchs.	No. of days.	Inchs.	Direction.	Resultant.	Mean Force or Velocity.	
1840	28.0	+5.0	-0.49	1-8.3	57	4	1	4.75	6	24	0.61	
1841	22.4	+3.0	-0.43	1-3.7	43	7	0	0.000	9	0	1.03	
1842	26.9	+3.0	-0.43	1-2.2	46	2	1	3.625	8	3	1.05	
1843	14.5	+3.0	-0.57	1-2.2	47	7	1	4.475	21	14.4	0.43	
1844	26.0	+3.0	-0.47	1-0.4	57	5	0	0.430	9	10.0	0.69	
1845	26.0	+3.0	-0.46	1-3.0	50	5	0	imperf	7	10.0	0.65	
1846	20.4	+2.6	-0.41	1-2.2	57	6	0	0.000	13	46.1	0.69	
1847	21.5	+1.5	-0.42	1-0.0	43	2	2	0.550	13	27.3	0.69	
1848	26.6	+3.0	-0.46	1-0.0	47	5	4	0.775	8	10.8	2.53	
1849	19.5	+3.5	-0.41	1-0.2	50	3	2	0.240	13	19.2	5.69	
1850	26.0	+3.0	-0.49	1-1.3	47	9	7	2.235	9	23.1	4.86	
1851	27.6	+4.4	-0.50	1-3.3	48	9	7	2.600	4	2.4	3.43	
1852	23.4	+0.4	-0.41	1-3.2	44	4	3	0.650	11	13.0	1.09	
1853	24.1	+1.1	-0.43	1-0.0	44	0	4	1.030	15	12.6	3.34	
1854	21.1	+1.0	-0.42	1-5.7	48	4	5	1.460	15	18.0	2.51	
1855	15.4	+7.0	-0.87	1-25.0	62	3	2	1.770	14	21.8	1.68	
1856	15.7	+7.3	-0.85	1-18.7	51	0	0	0.000	8	9.7	4.33	
1857	28.5	+5.5	-0.51	1-5.9	57	1	11	3.050	11	11.7	7.70	
M	22.98	44.14	-5.78	49.92	4.1	1.139	10.8	17.27	7.61	7.61	3.68	

MONTHLY METEOROLOGICAL REGISTER, AT THE PROVINCIAL MAGNETICAL OBSERVATORY, TORONTO, CANADA WEST—MARCH, 1857.

Latitude—43 deg. 39.4 min. North. Longitude—79 deg. 21 min. West. Elevation above Lake Ontario, 108. feet.

Day.	Barom. at temp. of 32°.			Temp. of the Air.			Mean Temp. of the Average.	Tens. of Vapour.			Humidity of Air.			Direction of Wind.			Re- sultant Direc- tion.	Velocity of Wind.			Rat- in Inches.	Znoes in Inches.									
	G. A. M.	2 P. M.	10 P. M.	MEAN	Temp. of the Air.			6	10	P. M.	0	2	10	Direction of Wind.				G. A. M.	2 P. M.	10 P. M.			G. A. M.	2 P. M.	10 P. M.						
					6 A. M.	2 P. M.								10 P. M.	G. A. M.	2 P. M.										10 P. M.					
1	29.234	29.115	—	—	15.8	23.8	0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—							
2	750	855	29.518	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—						
3	788	522	490	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—						
4	581	611	580	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—						
5	393	305	312	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—						
6	373	355	488	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—						
7	855	789	862	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—						
8	897	962	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—						
9	820	195	527	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—						
10	667	653	649	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—						
11	626	577	727	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—						
12	812	966	996	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—						
13	976	820	651	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—						
14	515	516	667	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—						
15	755	720	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—						
16	551	486	515	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—						
17	591	610	636	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—						
18	430	325	463	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—						
19	418	222	329	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—						
20	461	500	486	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—						
21	342	603	790	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—						
22	30 000	29 092	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—						
23	532	443	660	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—						
24	606	481	482	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—						
25	445	656	602	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—						
26	631	637	676	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—						
27	646	602	624	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—						
28	610	621	682	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—						
29	730	762	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—						
30	865	871	873	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—						
31	847	859	863	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—						
M	5988	28 5657	29 6176	29 5937	22 62 62	32 98	27 40	27 82	—	2 56	117 128	125 124	86	67	78	77	—	—	—	—	—	—	—	—	—						
																										7 84	13 92	9 47	10 84	9 935	11 3

REMARKS ON TORONTO METEOROLOGICAL REGISTEE FOR MARCH, 1857.

Highest Barometer 30.006 at midnight on 12th } Monthly range =
 Lowest Barometer 29.115 at 2 p. m. on 1st } 0.891 inches.
 Mean temperature 57° 9 on p. m. of 23rd } Monthly range =
 Minimum temperature 57° 9 on p. m. of 23rd } 63° 1
 Maximum temperature 58° 25 } Mean daily range = 17° 46
 Mean minimum temperature 57° 79 }
 Mean maximum temperature 58° 25 }
 Greatest daily range 37° 0 from p. m. of 1st to a. m. of 2nd.
 Least daily range 6° 0 from p. m. of 24th to a. m. of 25th.
 Warmest day 23rd Mean Temperature 45° 13 } Difference = 43° 03.
 Coldest day 2nd Mean Temperature 17° 10 }
 Maximum of Solar 68° 8 on p. m. of 23rd } Monthly range =
 Radiation of Terrestrial 11° 6 on a. m. of 2nd } 80° 3
 Aurora observed on 2 nights, viz.: 16th and 17th; possible to see Aurora on 13 nights;
 impossible to see Aurora on 18 nights.

Snowing on 16 days, depth, 11.3 inches; duration of fall, 48.6 hours.
 Raining on 4 days; depth, 0.335 inches; duration of fall, 11.1 hours.
 Mean of cloudiness = 0.61; most cloudy hour observed, 6 a. m., mean = 0.66; least
 cloudy hour observed, 10 p. m.; mean = 0.53.

Sums of the components of the Atmospheric Current, expressed in Miles.

North	South	West
5293.85	1193.55	688.35
		4751.59

Resultant direction of the wind, N 65° W; Resultant Velocity, 6.63 miles per hour.
 Mean velocity of the wind 10.84 miles per hour.
 Maximum velocity 36.5 miles per hour, from noon to 1 p. m. of 16th.
 Most windy day 6th—Mean velocity, 23.76 miles per hour.
 Least windy day 16th—Mean velocity, 1.30 do
 Most windy hour 4 to 5 p. m.—Mean velocity, 14.55 do } Difference
 Least windy hour 6 to 7 a. m.—Mean velocity, 3.16 do } 6.39 miles.

3rd—Faint halo round the Sun at 2 p. m. Perfect halo round the Moon during
 the evening.
 6th—Perfect halo round the Moon, 7 to 8 p. m.
 6th—Perfect halo round the Moon, from 9 p. m.
 8th—Halo round the Moon at 9 p. m.
 10th—Corona round the Moon from 10 p. m.
 14th—Halo round the Moon 0.30 a. m.
 16th—Halo round the Sun at 9 a. m.
 17th—Perfect halo and faint Parhelia at 4.50 p. m. Splendid meteor in N. at
 8.30 p. m.

32nd—Perfect halo and Parhelia at 0.45 p. m. Sheet-lightning in W. and S. W.
 at 10 p. m.
 31st—Perfect solar halo and Parhelia at 9.30 a. m.
 The mean temperature of the month was 2° lower than that of the average of the
 last 18 years.
 The depth of Rain was less than one quarter of its average amount.
 The resultant direction of the wind from 1848 to 1857, for the month of March,
 was N 68° W, and the resultant velocity 8.19 miles per hour.
 The velocity &c. of the wind for the last two days of the month were in perfect—
 the anemometer having been dismantled for repair.

COMPARATIVE TABLE FOR MARCH.

YEAR.	TEMPERATURE.				RAIN.		SNOW.		WIND.		
	Mean.	Difference from Average.	Maximum observed.	Minimum observed.	Range.	No. of days.	Inches.	No. of days.	Inches.	Resultant Direction.	Mean Velocity.
1840	32.3	+ 3.5	56.9	8.7	46.2	8	1.640	8	1.640	0	—
1841	27.7	+ 2.1	53.5	6.9	60.4	5	1.170	7	1.170	—	0.51 lbs.
1842	34.8	+ 6.0	68.7	14.9	63.8	4	3.169	8	3.169	—	0.70 "
1843	21.8	+ 1.5	38.6	2.8	41.4	2	0.625	18	2.7	—	1.18 "
1844	31.3	+ 5.6	61.7	9.6	40.7	8	2.470	8	2.470	—	0.57 "
1845	35.4	+ 3.3	49.3	7.6	41.7	9	1.965	8	1.965	—	0.66 "
1846	33.1	+ 3.0	44.3	4.8	39.5	5	0.850	6	0.850	—	0.30 "
1847	26.2	+ 1.2	68.9	6.0	40.0	5	1.220	6	1.220	—	0.71 "
1848	33.6	+ 3.7	53.4	15.4	38.0	2	0.745	7	0.745	—	2.035-80 mls.
1850	29.8	+ 0.0	46.0	6.0	40.0	3	0.450	7	0.450	—	1.485-37 "
1851	32.4	+ 2.6	58.7	13.1	45.8	8	3.060	12	3.060	—	2.627-62 "
1852	27.7	+ 2.1	44.8	3.2	48.0	6	0.770	9	0.770	—	1.937-65 "
1853	30.6	+ 0.8	56.3	0.1	56.4	8	1.060	8	1.060	—	0.71-16.81 "
1854	30.7	+ 0.9	52.8	10.4	42.4	5	2.425	3	2.425	—	3.563-87 "
1855	28.5	+ 1.3	48.6	2.9	51.5	5	1.485	11	1.485	—	5.07 W 3.258-02 "
1856	23.1	+ 6.7	39.3	13.6	52.9	4	0.000	12	0.000	—	5.07 W 7.881-39 "
1857	27.8	+ 2.0	56.5	3.9	60.4	4	0.835	15	0.835	—	6.63-10.84 "
Mean	29.82	...	52.14	3.77	46.37	5.3	1.443	8.5	1.443	—	7.88

MONTHLY METEOROLOGICAL REGISTER, ST. MARTIN, ISLE JESUS, CANADA EAST—FEBRUARY, 1867.

(NINE MILES WEST OF MONTREAL.)

BY CHARLES SMALLWOOD, M. D., L.L.D.

Latitude—45 deg. 32 min. North. Long 'tude—73 deg. 36 min. West. Height above the Level of the Sea—118 feet.

Day	Barom. corrected and reduced to 32°		Temp. of the Air.		Tension of Vapor.		Humidity of Air.		Direction of Wind.		Velocity in miles per hour.		Mean direction of Wind.	Rain in inches.	Snow in inches.	WEATHER, &c.	
	6 A.M.	2 P.M.	6 A.M.	2 P.M.	6 A.M.	2 P.M.	6 A.M.	2 P.M.	6 A.M.	2 P.M.	6 A.M.	2 P.M.				6 A.M.	2 P.M.
1	29.581	29.655	20.721	12.3	0.63	105.078	84	82	06	WSW	W by S	W by S	19.85	13.28	...	...	Cir. Str. 10.
2	7.19	7.17	.023	14.3	0.59	076.040	60	54	83	W by S	W by N	W by N	12.22	6.82	...	...	Clear.
3	29.229	30.213	30.065	4.3	0.39	083.057	81	64	74	WNW	S by W	S by E	6.13	0.38	...	...	Cir. Str. 10.
4	29.729	29.146	21.5	6.7	0.59	115.083	90	76	82	ENE	NE by E	N by E	8.81	0.40	...	...	Do. 10.
5	30.289	29.079	29.860	9.1	0.82	091.147	83	87	96	ENE	NE by E	N by E	12.51	0.37	...	...	Rain.
6	29.961	29.960	30.033	27.0	1.44	303.186	83	89	84	S by W	N by E	E by N	6.06	1.22	...	...	C. C. Str. 0.
7	9.16	9.15	29.885	33.4	1.69	337.253	82	87	92	SSE	NW by S	SE by S	2.62	13.63	...	...	Do. 6.
8	0.16	0.36	0.10	39.1	0.24	282.171	89	87	89	SE	SW by S	W by S	17.53	10.30	...	...	C. C. Str. 4.
9	30.235	30.309	30.345	7.0	0.61	074.066	88	83	87	NW	WNW	S	17.06	7.30	...	...	C. C. Str. 4.
10	29.831	29.892	30.388	9.6	0.67	113.026	99	87	86	SSE	WNW	WNW	10.31	9.53	...	...	Cir. Str. 10.
11	30.486	30.455	603	11.9	0.21	031.021	75	82	73	WNW	W	WNW	2.70	8.09	...	...	Do. do.
12	7.62	5.69	436	11.7	0.16	068.012	60	82	84	ENE	SE	NE by E	1.32	5.86	...	...	Do. do.
13	29.825	29.763	29.941	11.1	0.38	101.207	90	87	91	SSE	SW	NE by E	14.32	6.53	...	...	Do. do.
14	3.58	2.07	836	12.0	17.3	081.084	066	84	73	76	ENE	NE by E	14.32	6.53	...	...	Cir. Str. 10.
15	7.25	7.05	869	38.0	46.1	217.282	200	90	86	90	ENE	NE by E	8.60	1.35	...	...	Do. do.
16	7.50	7.79	785	34.5	35.5	203.210	187	91	90	89	ENE	NE by E	0.63	1.50	...	...	Do. do.
17	8.65	6.15	597	32.5	36.7	182.218	182	91	90	91	ENE	NE by E	0.17	0.22	...	...	Fog.
18	7.80	8.62	985	30.0	36.0	171.199	144	90	87	88	SSE	NE by E	3.00	4.90	...	...	Rain.
19	9.05	9.36	30.185	4.8	15.6	105.140	098	87	80	88	ENE	NE by E	31.72	15.75	...	...	Cir. Str. 10.
20	29.293	30.030	29.908	17.4	24.0	171.199	144	90	87	88	SSE	NE by E	17.80	10.20	...	...	Do. do.
21	27.537	29.604	29.902	15.9	23.6	087.101	096	85	74	83	ENE	NE by E	5.87	6.81	...	...	Cir. Str. 10.
22	8.83	7.82	752	24.0	41.0	123.240	187	79	87	90	ENE	NE by E	1.47	8.70	...	...	Do. do.
23	6.05	5.62	757	29.0	42.0	152.225	175	82	79	91	ENE	NE by E	14.99	9.01	...	...	Cir. Str. 10.
24	7.40	5.88	317	35.0	50.0	195.304	227	89	80	85	SSE	S	1.98	0.00	...	...	Do. do.
25	3.70	4.34	697	42.9	30.1	243.233	160	89	79	86	WSW	WNW	24.07	11.33	...	...	Cir. Str. 6.
26	9.58	9.14	30.257	13.5	5.71	075.058	80	73	89	NW	NW	NW	18.70	11.87	...	...	Do. do.
27	3.255	0.01	29.704	1.0	13.5	043.096	083	87	83	83	NE	NW by S	6.70	15.70	...	...	C. C. Str. 10.
28	3.78	3.74	30.541	9.4	0.79	115.079	88	82	89	SW	WNW	NW by W	6.70	15.70	...	...	C. C. Str. 4. A. B.

MONTHLY METEOROLOGICAL REGISTER, ST. MARTIN, ISLE JESUS, CANADA EAST—MARCH, 1867.
(NINE MILES WEST OF MONTREAL.)

BY CHARLES SMALLWOOD, M. D., L. L. D.

Latitude—45 deg. 33 min. North. Longitude—73 deg. 36 min. West. Height above the Level of the Sea—118 feet.

Day	Barom. corrected and reduced to 32° Fahr.			Temp. of the Air.			Tension of the Vapor.			Humidity of Air.			Direction of Wind.			Velocity in miles per hour.			Mean direction of Wind.	Rain in Inches.	Snow in Inches.	WEATHER, &c.		
	6 A.M.	3 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	29.466	29.870	29.864	4.4	23.1	9.0	0.051	0.95	0.89	86	64	90	S E	S E	N E by E	0.83	1.86	1.66	...	...	...	Cir. Str. 4.	C. St. 10 S. H.	Clear Aur. Bor.
2	801	857	883	2.0	17.0	6.8	0.046	0.89	0.82	83	81	80	N E	N E	N E by N	13.02	8.12	8.50	...	...	...	Cir. Cum. Str. 4.	Clear.	Do.
3	827	701	857	3.0	16.0	16.7	0.041	0.84	0.96	91	84	90	W S W	W	W	7.19	2.83	7.60	...	...	...	Clear.	Do.	Do.
4	717	749	857	19.3	28.4	22.8	0.121	1.19	1.12	91	71	77	S by W	S by W	S by W	4.77	0.33	1.61	...	...	...	Cir. Cum. Str. 4.	Cir. Str. 10.	Cir. Str. 10.
5	871	715	860	10.0	28.0	33.7	0.079	2.14	1.79	88	84	85	E by N	S E	S E	0.11	13.07	14.23	...	...	...	Hoarfrost.	Cir. Str. 10.	Do. 10.
6	870	610	877	31.1	26.2	14.1	0.042	1.14	0.82	89	70	78	W by N	W	W	20.60	19.33	7.22	...	...	...	Cir. Str. 10.	Cir. Cum. Str. 10.	Clear.
7	563	820	832	2.0	20.2	2.7	0.031	1.03	0.58	82	80	87	W by S	W	S	0.46	2.86	1.42	...	...	...	Clear.	Do.	Do.
8	80	138	30	5.0	19.5	23.6	0.053	1.35	1.35	89	32	90	N E	N E	S by E	3.81	5.42	9.31	...	...	...	Cir. Str. 10.	Snow.	Snow.
9	804	29	50	6.2	22.0	1.3	0.053	1.47	0.41	82	90	83	N E	W	W	16.73	10.11	14.00	...	...	...	Cir. Str. 4.	Clear.	Clear.
10	693	748	860	11.4	23.7	6.2	0.021	1.18	0.59	80	87	83	N E	N E	N E by E	0.37	1.61	1.48	...	...	...	Cir. Cum. Str. 2.	C. C. Str. 6.	Cir. Cum. Str. 6.
11	945	919	860	0.0	17.5	1.0	0.037	0.89	0.81	81	90	88	N E	N E	N E	5.76	8.51	12.03	...	...	...	Cir. Str. 8.	Cir. Str. 10.	Clear.
12	809	90	949	29	28.6	25.1	0.073	1.99	1.23	78	83	80	W by S	W	N W by N	2.83	7.00	11.17	...	...	...	Clear.	Do.	Do.
13	105	30	642	29	28.6	0.0	0.037	0.89	0.81	81	90	88	N E	N E	N E	0.00	2.26	1.15	...	...	...	Cir. Cum. Str. 10.	Clear.	Do.
14	641	29	610	7.15	13.5	37.0	0.25	1.07	1.46	191	108	88	W by S	W	N W by N	8.61	10.92	1.47	...	...	...	Cir. Str. 10.	Do. 6.	Clear Aur. Bor.
15	910	694	681	21.3	36.1	30.1	0.069	2.14	0.93	88	84	70	S W	S	S	2.86	2.81	1.77	...	...	...	Do. 8.	Do. 10.	Do. 10.
16	762	683	681	29.0	36.6	26.0	0.152	1.99	1.18	85	83	73	E	E	N	0.00	2.26	1.15	...	...	...	Do. 10.	Do. 10.	Do. 10.
17	667	595	907	30.0	33.4	27.1	0.182	1.87	1.37	91	90	82	N E	N E	N E	6.60	11.02	0.10	...	...	...	Rain.	Cum. Str. 10.	Do. 10.
18	891	585	846	13.9	34.2	32.3	0.081	1.87	1.74	90	86	86	E by N	N E	N E	23.00	44.86	40.00	...	...	...	Do. 10.	Do. 10.	Do. 10.
19	535	336	843	30.4	33.4	27.1	0.182	1.87	1.37	91	90	82	N E	N E	N E	2.86	2.81	1.77	...	...	...	Do. 8.	Do. 10.	Do. 4.
20	390	561	610	27.2	32.1	24.1	0.110	1.29	1.29	83	80	82	N E	N E	N E	3.86	9.81	1.06	...	...	...	Do. 10.	Do. 10.	Do. 4.
21	680	614	750	19.0	26.7	25.5	0.099	2.52	1.52	70	85	85	W by S	E S E	E S E	11.08	0.21	0.86	...	...	...	Clear.	Light Cir. 3.	Clear Aur. Bor.
22	300	100	186	30.0	24.1	20.1	0.43	2.29	2.09	82	83	86	N E	N E	N E	4.14	8.63	8.96	...	...	...	Cir. Str. 10.	Clear Aur. Bor.	Clear Aur. Bor.
23	993	29	794	29	27.4	22.0	0.046	32.9	1.15	1.86	178	82	N E	N E	N E	2.17	2.20	1.82	...	...	...	Cir. Str. 10.	Cum. Str. 10.	Clear.
24	734	646	646	31.7	48.6	36.2	0.186	2.61	2.10	83	74	81	N W	S W	S W	8.56	13.56	14.30	...	...	...	Do. 10.	Do. 8.	Do. 4.
25	400	403	621	32.7	34.9	23.5	0.189	1.78	1.60	92	83	86	W by N	W by N	W by N	12.42	8.78	8.73	...	...	...	Do. 8.	Do. 8.	Do. 10.
26	546	506	671	23.1	39.0	33.2	0.235	2.14	1.70	78	84	85	W by N	W	W	6.00	11.80	9.06	...	...	...	Do. 8.	Do. 8.	Do. 8.
27	614	599	681	30.7	41.1	35.8	0.152	2.17	1.91	79	99	85	W S W	W by N	W by N	10.25	1.77	0.13	...	...	...	Cir. Str. 9.	Cir. Str. 10.	Do. 8.
28	639	640	687	33.9	41.1	35.8	0.152	2.17	1.91	79	99	85	W S W	W by N	W by N	6.28	6.34	3.50	...	...	...	Do. 8.	Do. 8.	Do. 7.
29	731	740	914	34.3	44.0	36.6	0.191	2.54	1.92	83	68	83	W by N	S W	S E	1.06	1.77	0.13	...	...	...	Clear.	C. C. Str. 2.	Clear.
30	890	914	939	29.0	47.1	36.3	0.160	2.52	1.92	86	74	82	W S W	W by N	W by N	2.37	6.34	3.50	...	...	...	Do. 4.	Do. 4.	Do. 4.
31	880	775	642	33.0	51.6	40.5	0.173	2.74	1.88	86	70	79	W S W	W by N	W by N	1.06	1.77	0.13	...	...	...	Do. 4.	Do. 4.	Cir. Str. 10.

REMARKS ON THE ST. MARTIN, ISLE JESUS, METEOROLOGICAL REGISTER
FOR FEBRUARY.

Barometer.....	{	Highest, the 12th day.....	30.782
		Lowest, the 14th	29.207
		Monthly Mean	29.915
		Monthly Range	1.555
Thermometer...	{	Highest, the 15th day.....	48° .1
		Lowest, the 12th day.....	-20 .1
		Monthly Mean	21°61
		Monthly Range	66 .2
Greatest intensity of the Sun's Rays.....			89° .7
Lowest point of Terrestrial Radiation			-21 .7
Mean of Humidity .....			.850
Rain fell on 6 days amounting to 2.074 inches ; it was raining 36 hours 40 minutes.			
Snow fell on 9 days, amounting to 15.11 inches ; it was snowing 42 hours 30 minutes.			
The most prevalent wind was the N E by E.			
The least prevalent wind S E by S.			
The most windy day the 27th ; mean miles per hour 18.03.			
Least windy day the 17th ; mean miles per hour 0.34.			
The Aurora Borealis visible on 4 nights.			
Lunar Halo on the 6th day.			
Zodiacal Light bright during the month.			
The electrical state of the Atmosphere has indicated rather high and constant Tension.			
Ozone was in moderate quantity.			

REMARKS ON THE ST. MARTIN, ISLE JESUS, METEOROLOGICAL REGISTER
FOR MARCH.

Barometer	{	Highest the 22nd day.....	30.241
		Lowest the 19th day	29.243
		Monthly Mean	29.718
		Monthly Range	0.998
Thermometer	{	Highest the 30th day	54°3
		Lowest the 11th day	-11° .4
		Monthly Mean	23°79
		Monthly Range.....	65°7
Greatest Intensity of the Sun's Rays			94°7
Lowest Point of Terrestrial Radiation			-12° .0
Mean of Humidity.....			.826
Rain fell on 3 days, amounting to 0.723 inches ; it was raining 10 hours and 50 minutes.			
Snow fell on 9 days, amounting to 17.01 inches ; it was snowing 57 hours 40 minutes.			
Most prevalent wind, W by N. Least prevalent wind, E.			
Most windy day, the 19th day ; mean miles per hour, 39.12.			
Least windy day, the 16th day ; mean miles per hour, 1.13.			
Most windy hour, from 6 to 7, P. M., 19th day ; velocity 77.70 miles.			
Aurora Borealis visible on 3 nights.			
The " Rossignol " first heard the 25th day.			
Wild Geese first seen on the 30th day.			
The electrical state of the atmosphere has indicated moderate intensity.			
Ozone was in moderate quantity.			
Zodiacal Light very bright.			

TO THE READER.

“So numerous a body as the Canadian Institute now is, ought to include a much greater number of working members; and the Council are led to believe that their apparent supineness arises, in part at least, from the mistaken idea that communications can only be made in the form of elaborate essays. They would strongly urge the encouragement of brief communications, in greater number, as at once more calculated to give general interest to the ordinary meetings, and to elicit such results of personal knowledge and observation as are best calculated to add to the true value of the published proceedings.

“Short notices of natural phenomena, features of local geology, objects of natural history, and the like subjects, derived from personal observation, must be readily producible by many members who have hitherto borne no active part in the Society’s proceedings, but whose contributions would most effectually promote the objects which it is designed to accomplish.”

Extract from the Annual Report of 1855.

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