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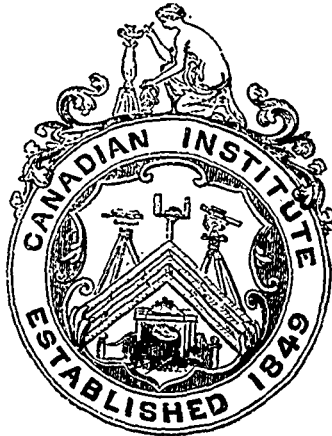
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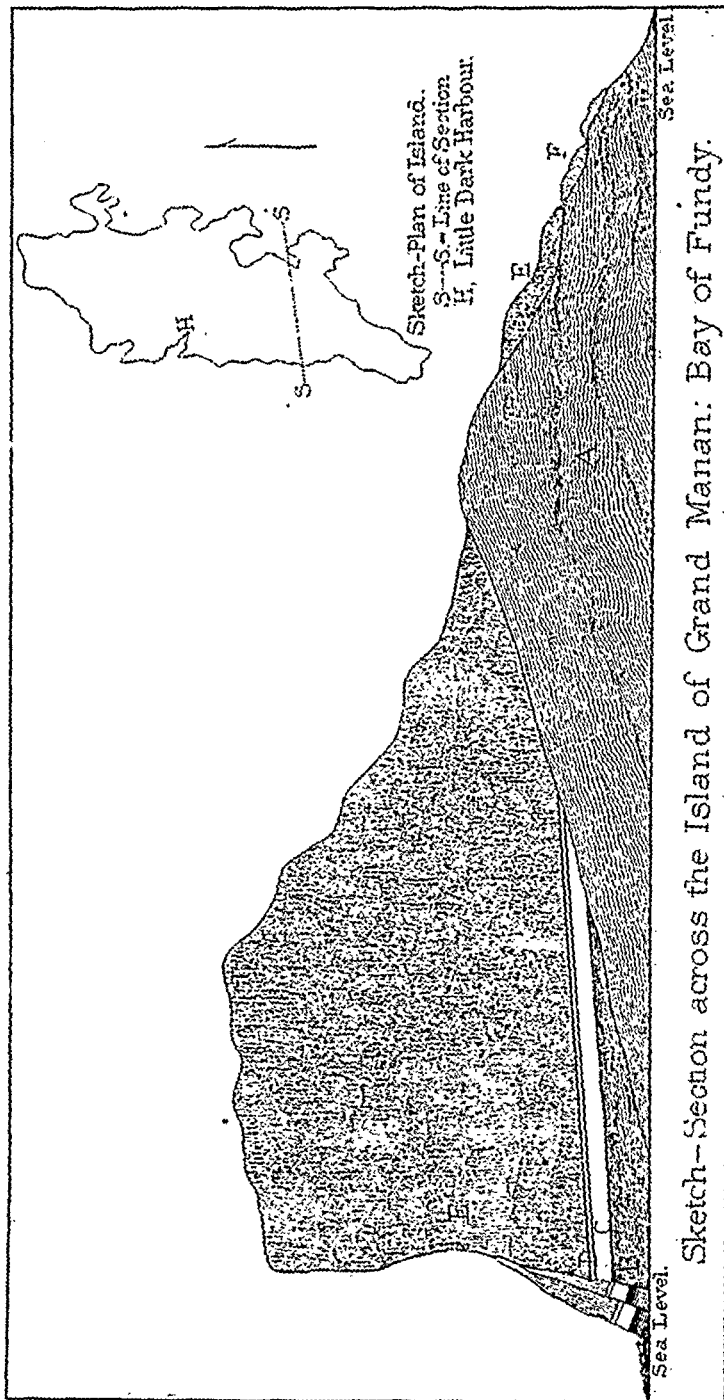
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Sketch--Section across the Island of Grand Manan: Bay of Fundy.

E. J. Chapman, del.

Copp, Clark & Co. Lith. Toronto.

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## RIGHTHANDEDNESS.

BY DANIEL WILSON, LL.D.,

PROFESSOR OF HISTORY AND ENGLISH LITERATURE IN UNIVERSITY COLLEGE, TORONTO.

(Read before the Canadian Institute 27th January, 1871.)

One after another of the assumed specialities of man, and his claims to a distinct classification in animated nature, is being ruthlessly swept away, in the marvellous revolutions of modern science. Hùchel discusses the steps by which he became a biped. Darwin follows down, from "an extremely remote period, his half-human ancestors," transforming the imitative growl of the first unusually wise ape, into the varied tones and cadences of the impassioned human orator. Cuvier's assumption for man of a distinct order, equally apart from *Quadrumana*, and *Cheiroptera*, as from *Brachiopoda* or *Gasteropoda*, has long since been challenged; and as for his *Bimana*, it is less in favour now than his classification of the medieval Devil, by means of the indispensable horns, tail and hoofs, as "a graminivorous animal." The most conceded to his *Bimana* in the levelling process of scientific revolution, is a place in the same order with *Quadrumana*, under a common title of *Primates*. Can anything more definite be made of an order of *Unimana*? Is man, with only rare and purely exceptional cases, right-handed; and does he alone, and invariably, manifest this preferential use of the right limb? The answer to those questions may prove to have a value in relation to more comprehensive enquiries.

The human hand is unquestionably the most perfect of hands, whatever be its relation to inferior developments of a similar organ. The wonderful complexity of its structure, its nice delicacy of touch, and its adaptation in all ways for being the organ of an intelligent volition, fitted for the execution of every requirement of ingenuity and skill, alike suggest its recognition as one special and distinctive feature of man's organization. The hand of the monkey is a locomotive, as well as a prehensile organ; whereas the differences between the hand and foot of man point to essentially diverse functions for each. The short, weak thumb, the long, nearly uniform fingers, and inferior play of the wrist, are advantageous to the tree-climber, and pertain to the hand as an organ of locomotion; whereas the absence of all such qualities in the human hand secures its permanent delicacy of touch, and its general adaptation for all manipulative purposes.

There are, however, unquestionably, traces of prehensile capacity in the human foot; and even of remarkable adaptability to certain functions of the hand. Well-known cases have occurred, of persons born without hands, or early deprived of them, learning to use their feet in many delicate operations, including not only the employment of pen and pencil, but the use of scissors, with a facility which still more strikingly indicates the separate action of the great toe, and its thumb-like apposition to the others. Still the human foot is not a hand. The small size of the toes, as compared with the fingers, and the position and movements of the great toe, alike point to diverse functions, and a greatly more limited range of action in the normal use of the toes. But the latent capacity of the system of muscles of the foot—scarcely less elaborate than that of the hand,—is obscured to us by the rigid restraints of the modern shoe. The power of voluntary action in the toes manifests itself not only in cases where early mutilation, or malformation at birth, compels the substitution of the foot for the hand; but among savages, where the unshackled foot is in constant use in climbing, and feeling its way through brake and jungle, the same free use of the toes, and especially the power of separating the great toe from the others, which may be seen in the involuntary movements of a healthy child, is retained. A very brief experience of the soft, yielding deer-skin moccasin of the Red Indian, in place of the rigid European shoe, restores even to the unpractised foot of the white man a freedom of action in the toes, a discriminating sense of touch, and a capacity for grasping rock or tree in walking or climbing, such as he had no concep-

tion of before. In the extreme case of the substitution of the foot for the hand, I have myself seen a woman, born without hands, execute elaborate pieces of scissor-work, and write not only with neatness, but—to apply the term adapted to perfect handiwork,—with great dexterity.

But while such evidence shows a capacity of development of the human foot for manipulative purposes, it very slightly affects the manifest diversity of functions indicated in the separate movements of the radius on the ulna, as contrasted with the fixity of the tibia and fibula; the distinction in form and action of the thumb and great toe; and the diverse articulations of the hand and foot in relation to the arm and leg. The human hand, as an instrument of constructive ingenuity and artistic skill, stands wholly apart from all the organs applied to the production of analogous workmanship among the lower animals. Man only, in any strict sense, is a manufacturer. Where the constructive ingenuity of the lower animals brings them into comparison with him, the arts of the instinctive weaver or builder owe none of their approximation to human workmanship to the development of an organ of manipulation.

Nevertheless, though the *Quadrumana* claim no place among the instinctive architects, weavers, or spinners, their hands place them in some respects at a decided advantage over other mammals. Imperfect as they are, and unfitted for the delicate operations in which man's hand executes the conceptions of his mind, they suffice for all the limited requirements of the forest-dweller. In climbing trees, as in seizing a small stick, or any other object which he can grasp, the monkey uses the thumb and finger as man does. It thus accomplishes all needful manipulations in the search for food: gathering and shelling nuts or pods, opening shell-fish, tearing off the rind of fruit, or pulling up roots. In picking out thorns or burs from its own fur, or in the favourite occupation of hunting for each other's parasites, the monkey uses the finger and thumb; and in many other operations, performs with the hand, what is executed by the quadruped or bird less effectually by means of the mouth or bill.

At first sight, we might be tempted to assume that the four-handed mammal had the advantage of us; as there are certainly many occasions when an extra hand could be turned to useful account. But not only do man's two hands prove greatly more serviceable for all the higher purposes of manipulation than the four hands of the ape; but as he

rises in the scale of intellectual superiority, he seems as it were to widen still further this difference in proportionate manipulative appliance, and to convert one hand into the special organ and servant of his will; while the other is relegated to a subordinate place, as its mere aider and supplement.

We have thus a progressive scale, from the imperfectly developed, on to the perfectly educated hand: all steps in its adaptation to the higher purposes of the manipulator. The hand of the rude savage, of the sailor, the miner, or blacksmith, while well fitted for the work to which it is applied, is a very different instrument from that of the chaser, engraver, or cameo-cutter; of the painter or sculptor. The latter, indeed, is unquestionably a result of development, whatever the other may be; for, as we have in the ascending scale the civilized and educated man, so also we have the educated hand as one of the most characteristic features of his civilization.

But so soon as attention is directed to the educated hand, the distinction of right and left-handedness acquires prominent importance. Whence does it arise? If it be the result of any organic structure, dependent, for example, on the relative disposition of the viscera, or of the great arteries of the upper limbs, we should look for some indications of it among the lower animals, and especially among the *Quadrumania*. But it has scarcely yet been studied even in the intermediate stage of savage man.

Where the subject has attracted any notice, the universality of right-handedness has been assumed, except in purely abnormal manifestations; and too frequently any disposition to deviate from it in childhood is treated as a bad habit, if not indeed as something nearly allied to perverse moral delinquency. But any evidence of the existence of right-handedness generally among savage races is exceedingly vague. In the rude manipulations of a purely savage life, the imperfection of the tools, and the general absence of combined operations, the distinction in the use of one hand rather than the other is of little importance. In digging roots, climbing rocks or trees, in the rude operations of the primitive boat-maker or hut-builder; in hunting, flaying, cooking, or most other of the operations pertaining not only to the hunter, but also to the pastoral stage: there is little manifest motive for the use of one hand more than the other; and on the supposition of either becoming more generally serviceable, it would attract no notice, nor interfere in any degree with the arts of life, though some gave a preference to the



right hand and others to the left. There are involved in it the two elements of a preference dependent on organic structure and consequent special adaptability; and a deliberate choice and education of one hand, as the result of a recognition of the convenience and facility to be derived from righthandedness. Of the former we have traces among the lower animals. In the case of dogs, for example, it may be noticed that they rarely move in the direct line of their own body, but incline to the right or left, so that the right hind-foot steps into the place of the left fore-foot, or *vice versa*. Horse-trainers could probably furnish facts relative to its natural action, indicating a use of the limbs of one side more promptly than the other. We readily recognize in the horse, as in other quadrupeds, a regular alternation in its paces, but modified by education for the various requirements of man. In the case, for example, of a horse, regularly trained for a lady's use, the action is as much the result of education, as that of one taught to perform in the circus, or drilled for combined action in military evolutions. It is to be noted, however, that the fashion of a lady's side-saddle has by no means been so uniform as to connect it with a universal righthandedness. The uniform custom at present is for a lady in riding to sit on the left side of her horse, holding the reins in the left hand, with the right disengaged for the free use of the whip or switch. But in Anglo-Saxon MSS, ladies are represented riding on the right side of the horse; and according to Mr. Thomas Wright, this continued down to about the time of Henry VIII. His two royal daughters, Mary and Elizabeth, are both represented on their great seals riding according to modern usage, on the left side. A correspondent of *Notes and Queries* states that it was very recently, and probably still is, the practice in Brazil, for a lady to sit on the right side of her horse. Such variations in usage or fashion show how readily universal custom may be mistaken for a natural law.

The elephant is affirmed by some to betray a strongly marked right-sidedness. One writer in *Nature* (April 14th. 1870,) specially refers to it as known to employ one tusk in preference to the other in rooting, &c. But the analogy is of doubtful application to the present enquiry, even though the action could be proved to indicate a constant preference. I observe in a fine specimen of a walrus skull recently added to the museum of the University of Toronto, that the left tusk is longer, larger, and more massive than the right one.

That a disposition to employ one limb in preference to another is observable in some of the lower animals, is, I think, undoubted. How

far it is general, or only exceptional, has yet to be determined by observation; but that action equivalent to righthandedness can be taught such animals as the dog, horse, or elephant, easily enough, is too obvious to be dwelt upon. I have found no difficulty in teaching a favourite dog to give the right paw when asked, and readily to discriminate between it and the left. But if the assumed universality, or general prevalence of righthandedness, is to be ascribed to organic structure, consequent on the disposition of the arteries, the heart, &c., then traces of the same ought to be common in the lower animals, and manifested among all savages. If, on the contrary, it is solely acquired, as a habit engendered by the frequent occasions in which man has to use the limbs of the two sides independently, and to give the preference uniformly to one or other in combined action, then it is scarcely conceivable that all nations, ancient and modern, savage and civilized, should be found, undesignedly, and without concert, selecting the limbs of the same side. But in this, as in so many other enquiries, the premises have been more or less taken for granted. Professor Buchanan, in his "Mechanical Theory of the Predominance of the Right Hand over the Left," starts with this assumption: "The use of the right hand in preference to the left must be regarded as a general characteristic of the family of man. There is no nation, race or tribe of men on the face of the earth at the present day, among whom this preference does not obtain; while, in former times, it is shown to have existed, both by historical documents and by the still more ancient and authentic testimony of certain words, phrases, and modes of speaking, which are, I believe, to be found in every spoken language." This assumes much which is probably true, but of which, thus far, we have no proof.

It is a piece of inconsequential reasoning to infer from the preference for one hand over another, of which the evidence is abundant in many languages, ancient and modern, that therefore the choice has invariably been of the same hand. This is, in many cases, a mere inference. We may legitimately enough translate the terms applied to the favourite hand by that of *right hand*, without thereby assuming that it invariably pertained to the same side. Manifestly in the sense of dexterity, righthandedness would be everywhere assigned to the side preferred by common consent or usage. Practically, the most useful member of the left-handed man is his "right hand," though it be on what is styled by the majority the left side, and no one would regard it as a misap-

plication of language to speak of any specially skilful use of it as an act of dexterity.

But the whole enquiry has to be reviewed *ab initio*, and various questions involved in it invite reconsideration. Is the superiority of the right hand over the left innate and congenital? Are there organic or constitutional reasons for the general preference? Or is it solely the result of acquired habit, consequent upon the recognised convenience of simultaneous uniformity of action among members of the same community? A further question of considerable interest also invites inquiry, viz.: Is right or left handedness, however acquired, transmitted hereditarily?

The statistics of this enquiry have yet to be collected. Very different opinions have been expressed as to the proportion of left to righthandedness, and such evidence as exists seems to point to considerable variations in this respect at different times and among diverse nations. The general prevalence of righthandedness among savage nations is still a mere assumption. Its manifestations, apart from combined operations, in the rude arts of savage life, are obscure, and not likely to attract attention, unless sought for. But in their languages terms are to be met with, showing at an early stage the preferential use of one hand. Even in the rudest state of society, man as a tool-using animal has this habit engendered in him; and as he progresses in civilization, and improves on his first rude weapons and implements, there must arise an inevitable tendency to give the preference to one hand over the other, not only in combined action, but from the necessity of adapting certain tools to the hand. The Maories of New Zealand manifest a general righthandedness in the use of the musket, even in their wild war dances. Whether this should be regarded as an acquired European practice—no more, in fact, than a modified "Manual Exercise," with what is practically a right-handed instrument,—or as the adaptation of native habits to a novel weapon, might seem of difficult solution; but it will be seen that the native language retains the evidence of right-handedness wholly independent of European influence.

The musket is fitted for a habitually right-handed people. So, in like manner, the adze, the plane, the gimlet, the screw, and other mechanical tools, must be adapted to one or the other hand. Scissors, snuffers, shears, and other implements specially requiring the action of the thumb and fingers, are all made for the right hand. A clasp-knife

is constructed with a view to the same. Not only the lock of the gun, or rifle, but the bayonet and the cartridge-pouch, are made or fitted on the assumption of the right hand being used; and even the arrangements of the fastenings of the dress are adapted to this habitual preference of the one hand over the other; so that the reversing of button and button-hole, or hook and eye, is attended with marked inconvenience. Yet even in this, much of which is due to habit is ascribed to nature. A Canadian friend, familiar in his own earlier years, at an English public school and university, with the game of cricket, tells me that when it was introduced for the first time into Canada, within the last twenty years, left-handed batters were common in every field; but the immigration of English cricketers has since introduced, for the most part, the prevailing usage of the mother country. It was not that the batters were, as a rule, left-handed; but that the habit of using the bat on one side or other was in the majority of cases so little influenced by any predisposing bias, that it was readily acquired in either way.

It is obvious that education has much to do with a full-developed right-handedness. But a very slight bias, traceable to organic structure, may have sufficed to prompt the preference at first, and so to originate the law of dexterity. The bilateral symmetry of our structure, so general in animal life, seems at first sight opposed to any inequality of action in symmetrical organs. But anatomical research reveals at a glance the deviation of internal organic structure from such seemingly balanced symmetry. Moreover, right or left-handedness is not limited to the hand, but equally affects the lower limb; as may be seen in foot-ball, skating, in the training of the opera-dancer, &c.; and eminent anatomists and physiologists have affirmed the existence of a greater development throughout the whole right side of the body. Sir Charles Bell says: "The left side is not only the weaker, in regard to muscular strength, but also in its vital or constitutional properties. The development of the organs of action and motion is greatest upon the right side, as may at any time be ascertained by measurement, or the testimony of the tailor or shoemaker." He adds, indeed, "certainly, this superiority may be said to result from the more frequent exertion of the right hand; but the peculiarity extends to the constitution also, and disease attacks the left extremities more frequently than the right."

With lefthandedness all this is reversed; and it has accordingly been regarded as the result of abnormal development. One supposition is that it depends on the relative position of the viscera, and the conse-

quent increase of circulation on one side more than the other; so that any transposition tending to reverse this action will naturally lead to greater vitality and muscular development on the opposite side. Another theory traces to the reverse development of the great arteries of the upper limbs, a greater flow of blood to the left side; while a third ascribes it directly to the supply of nervous force dependent on the early development of the brain on one side or the other.

So far as this line of argument prevails, it inevitably leads to the result that the preference of the right hand is no mere perpetuation of convenient usage, matured into an acquired, or possibly a hereditary habit; but that it is, from the first, traceable to innate physical causes. This, as Sir Charles Bell conceives, receives confirmation from the fact already referred to, that right or left-handedness is not restricted to the hand, but affects the corresponding lower limb, and, as he believes, the whole side. "No boy," he observes, "hops upon his left foot, unless he be left-handed. The horseman puts the left foot in the stirrup and springs from the right. We think we may conclude, that everything being adapted, in the conveniences of life, to the right hand, as for example the direction of the worm of the screw, or of the cutting end of the augur, is not arbitrary, but is related to a natural endowment of the body. He who is left-handed is most sensible to the advantages of this adaptation, from the opening of the parlour door to the opening of a pen-knife." And so Sir Charles Bell concludes: "On the whole, the preference of the right hand is not the effect of habit, but is a natural provision, and is bestowed for a very obvious purpose." Here right-handedness is spoken of as "a natural endowment of the body," and the whole argument is based on this assumption. But much of it would be equally explicable as the result of adaptations following on an acquired habit. Its full force will come under review at a later stage. Meanwhile it is desirable to review the various and conflicting opinions advanced by other inquirers.

The theory of Dr. Barclay, the celebrated anatomist, is thus set forth by Dr. Buchanan, from notes taken by him when a student: "The veins of the left side of the trunk, and of the left inferior extremity, cross the aorta to arrive at the vena cava; and some obstruction to the flow of blood must be produced by the pulsation of that artery." To this Dr. Barclay traced indirectly the preferential use of the right side of the body, and especially of the right hand and foot. "All motions," he stated, "produce obstruction of the circulation; and obstruction

from this cause must be more frequently produced in the right side than the left, owing to its being more frequently used. But the venous circulation on the left side is retarded by the pulsation of the aorta, and therefore the more frequent motions of the right side were intended to render the circulation of the two sides uniform." The idea, if correctly reported, is a curious one, as it traces righthandedness to the excess of a compensating force for an assumed inferior circulation pertaining naturally to the right side.

Professor Hyrtl, of Vienna, another celebrated anatomist, discusses the subject in his *Handbuck der Topographischen Anatomie* (1860), and affirms a correspondence between the ratio of left-handed persons and the occurrence of certain deviations from the normal arrangements of the blood-vessels. "It happens," he says, "in the proportion of about two in a hundred cases, that the left subclavian artery has its origin *before* the right, and, in these cases lefthandedness exists, as it also often actually does in the case of complete transposition of the internal organs; and it is found that the proportion of left-handed to right-handed persons is also about two to one hundred." Prof. Hyrtl thinks that ordinarily the blood is sent into the right subclavian under a greater pressure than into the left, on account of the relative position of these vessels, that in consequence of the greater supply of blood, the muscles are better nourished and stronger, and that therefore the right extremity is more used. In cases of anomalous origin of the left subclavian, &c., the reverse occurs, and therefore the left hand is employed in preference." The theory of Professor Hyrtl has this feature to recommend it, that it equally accounts for the prevalent righthandedness, and the exceptional lefthandedness; nor can any solution of the inquiry, founded on organic structure, prove satisfactory which fails to do so. But the statistics of such internal organic structure, and its correlation with a corresponding abnormal action, are nearly inaccessible. With rare exceptions, it lies wholly beyond observation in the living subject; and any relation between it and the vital actions of individuals thus affected, are unknown. So far, however, as ascertained facts can be appealed to, they fail to sustain the above theory.

The late eminent anatomist, Professor Gratiolet, sought for a solution of the difficulty in another direction. He maintained that in the early stages of foetal development, the anterior and middle lobes of the brain on the left side were in a more advanced condition than those on the right side, the balance being maintained by an opposite condition of

the posterior lobes. Hence, in consequence of the well-known decussation of the nerve-roots, the right side of the body—so far as it is influenced by brain-force,—would, in early foetal life, be better supplied with nervous force than the left side; and thereby movements of the right arm would precede and be more perfect than those of the left. But the premises of Gratiolet are disputed; and even if proved, they must raise further questions, not merely as to the origin, but also as to the influence of such an unequal development of the brain on the action of the limbs.

Professor Buchanan, of Glasgow, resorts to a different theory to account for righthandedness.\* According to him, "The preferential use of the right hand is not a congenital, but an acquired attribute of man. It does not exist in the earliest periods of life." Nevertheless, "no training could ever render the left hand of ordinary men equal in strength to the right;" for "it depends upon mechanical laws arising out of the structure of the human body." This theory is thus explained: In infancy and early childhood, there is no difference in power between the two sides of the body; but so soon as the child becomes capable of bringing the whole muscular force of the body into play, "he becomes conscious of the superior power of his right side—a power not primarily due to any superior force or development of the muscles of that side, but to a purely mechanical cause. He cannot put forth the full strength of his body without first making a deep inspiration; and by making a deep inspiration, and maintaining afterwards the chest in an expanded state, which is essential to the continuance of his muscular effort, he so alters the mechanical relations of the two sides of his body, that the muscles of his right side act with a superior efficacy; and, to render the inequality still greater, the muscles of the left side act with a mechanical disadvantage." Hence the preference for the right side whenever unusual muscular power is required, and with the greater exercise of the muscles of the right side, their consequent development, until the full predominance of the right side is the result.

This theory is based, not merely on the disposition of the lungs on the right side, but on these further facts: that the right lung is more capacious than the left, having three lobes, while the left has only two; that the liver, the heaviest organ of the body, is on the same side;

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\* Mechanical Theory of the Predominance of the Right Hand over the Left; or, more generally, of the Limbs of the Right Side over those of the Left Side of the Body. By Andrew Buchanan, M.D., Professor of Physiology in the University of Glasgow.

and that the common centre of gravity of the body shifts more or less towards the right, according to the greater or less inspiration of the lungs, and the consequent inclination of the liver resulting from the greater expansion of the right side of the chest. Herein may possibly lie a slight predisposing cause leading to a preferential use of the right side. But the evidence adduced altogether fails to account for what, on such a theory, become abnormal deviations from the natural action of the body. The position of the liver, and the influence of a full inspiration, combine, according to Dr. Buchanan, to bring the centre of gravity of the body nearly over the right foot. Hence in actively overcoming a resistance from above, as when the carter bears up the shaft of his cart on his shoulder, the muscular action originates mainly with the lower limb of the same side, which partakes of the same muscular power and development as the corresponding upper limb. On all such occasions, where the muscular action is brought directly into play in overcoming the weight or resistance, Dr. Buchanan affirms that the right shoulder is much more powerful than the left; but in the passive bearing of weights it is otherwise. The very fact that the centre of gravity lies on the right side, gives a mechanical advantage in the use of the left side in sustaining and carrying burdens; and this assigned pre-eminence of the left side and shoulder, as the bearer of burdens, is accordingly illustrated by the Professor by means of an engraving, representing "a burden borne on the left shoulder as the summit of the mechanical axis passing along the right lower limb."

Recent opportunities have afforded me a very practical means of testing this question. While travelling in one of the large steamboats on the Mississippi river, my attention was attracted by the deck-porters, who at every landing are employed in transporting the freight to and from the levee, and in supplying the vessel with cord-wood and coal. They constitute, as a class, the rudest representatives of unskilled labour, including both whites and negroes. For hours together they are to be seen going at a run to and from the lower deck of the vessel, carrying sacks of grain, bales, chests, or bundles of cord-wood. Watching them closely, I observed that some gave the preference to the right and some to the left shoulder in bearing their burden; and this whether, as with the bale and sack, they had it placed on the shoulder by others, or with the cord-wood, which they loaded for themselves. Noting, accordingly, in separate columns, the use of the right and left shoulder, and in the case of loading with cord-wood the employment of the right



and left hand, I found the difference did not amount to two to one. In one case I noted 137 carry the burden on the left shoulder to 81 on the right; in another case 76 to 45; and in the case of loading cord-wood, where the natural action of the right hand is to place the burden on the left shoulder, and where, therefore, the use of the right shoulder implies that of the left hand, the numbers were 65 using the left shoulder and 36 the right. Here, therefore, a practical test of a very simple yet reliable kind, fails to confirm the idea of any such mechanical cause inherent in the constitution of the human frame, tending to a uniform exertion of the right side and the passive employment of the left, in all muscular action.

But the unsatisfactory nature of this theory as a solution of right-handedness is placed beyond doubt, when it is applied to cases of deviation from the normal action which is assumed to result from it, and to render right-handedness a mechanical necessity. Many instances of left-handedness Dr. Buchanan considers to be probably "merely cases of ambidextrousness, when the habit of using the left side, in whatever way begun, has given to the muscles of that side such a degree of development as enables them to compete with the muscles of the right side, in spite of the mechanical disadvantages under which they labour;" but he affirms, "there is an awkwardness in the muscular efforts of such men, which seems to indicate a struggle against nature." But for those indisputable cases of "men who unquestionably use their left limbs with all the facility and efficiency with which other men use their right," he is compelled either to resort to the gratuitous assumption of "malformations and pathological lesions in early life, diseases of the right lung, contraction of the chest from pleurisy, enlargement of the spleen, distortions of the spine," &c.; or a complete reversal of the whole internal organic structure. There are men, he says, enjoying perfect health, "in whom the position of all the thoracic and abdominal viscera is reversed: there are three lobes of the left lung, and only two of the right; the liver is on the left side, and the heart on the right." But where such is the case, though it may escape observation, it is readily ascertainable during life. Any one can tell on which side his heart lies. I have long been accustomed to take note of left-handedness, and have never known a case where it could be accounted for in this way; while cases of ascertained transposition of the viscera are on record without any corresponding left-handedness. Professor Hyrtl, while referring to such abnormal organization as one of its causes, docs.

not venture to affirm more than that the one is often accompanied by the other. The cases hitherto observed are, in all, so very few, that without the invariable accompaniment of the left-sided lungs with left-handed action, the argument is of no value.

More recently, Dr. Humphry, of Cambridge, has discussed the cause of the preferential use of the right hand, in his monograph on "The Human Foot and the Human Hand," but with no very definite results. Many attempts, he says, have been made to answer the question, Why is man usually right-handed? "but it has never been done quite satisfactorily; and I do not think that a clear and distinct explanation of the fact can be given. There is no anatomical reason for it with which we are acquainted. The only peculiarity that we can discern, is a slight difference in the disposition, within the chest, between the blood-vessels which supply the right and left arms. This, however, is quite insufficient to account for the disparity between the two limbs. Moreover, the same disposition is observed in left-handed persons and in some of the lower animals; and in none of the latter is there that difference between the two limbs which is so general among men." Dr. Humphry accordingly inclines to the view that the superiority of the right hand is not natural, but acquired. "All men," he says, "are not right-handed; some are left-handed; some are ambidextrous; and in all persons, I believe, the left hand may be trained to as great expertness and strength as the right. It is so in those who have been deprived of their right hand in early life; and most persons can do certain things with the left hand better than with the right." So, far, therefore, Dr. Humphry's decision would appear to be wholly in favour of the conclusion that the superiority of the right hand is an acquired habit. But after stating thus much, he sums up with this very refined distinction: "Though I think the superiority of the right hand is acquired, and is a result of its more frequent use, the tendency to use it in preference to the left is so universal, that it would seem to be natural. I am driven, therefore, to the rather nice distinction, that, though the superiority is acquired, the tendency to acquire the superiority is natural."

This amounts to something very like an evasion of the real difficulty, unless we assume Dr. Humphrey to mean only what Dr. Buchanan states, that during the weakness of infancy and childhood the two hands are used indiscriminately; and the preferential use of one side rather than the other does not manifest itself until the muscular system has acquired active development. All the processes by which dexterity in

manipulation and the use of tools is manifested, are acquired. Men are not born with carpentering, weaving, modelling and architectural instincts, requiring no apprenticeship or culture, like ants, bees and spiders, martins and beavers: though the aptitude in mastering such arts is greater in some than in others. But if the tendency in their practice to use the right hand is natural, that is to say innate or congenital, then there need be no nice distinctions in affirming it.

But on any clearly defined physiological deductions of right-handedness from the disposition of the organs of motion, or circulation, or any other uniform relation of the internal organs, and the great arteries of the upper limbs, left-handedness becomes mysterious, if not inexplicable, unless on the assumption of a corresponding reversal of organic structure; for Dr. Humphry's assertion that "in all persons the left hand may be trained to as great expertness and strength as the right," is contradicted by the experience of left-handed persons in their efforts to apply the same training to the right hand.

Examples of the assumed organic causes of left-handedness, as already stated, have been repeatedly observed, with no such accompanying results. One case of the transposition of the viscera, in which, nevertheless, the person was right-handed, recorded by M. Géry, is quoted in Cruveillier's *Anatomie*, i. p. 65. Another is given by M. Gachet, in the *Gazette des Hôpitaux*, Aug. 31, 1861; and a third in the *Pathological Transactions*, vol. xix. p. 447 (*Nature*, Apr. 28, 1870). In like manner the theory of Professor Hyrtl fails on appeal to facts. A correspondent of *Nature* (P. S. June 9, 1870) refers to a case of transposition of the origin of the right subclavian artery—disclosed by the occurrence of aneurism,—where the person was ascertained to have been undoubtedly right-handed. So far, therefore, physiological evidence fails to account satisfactorily for right or left-handedness.

Turning to other sources of information relative to this supposed uniformity of general action, the evidence is of a very varied character; and many curious glimpses of the practice of ancient nations, and of savage races, are still recoverable. An interesting discovery, supposed to prove the simultaneous use, by preference, of the right and the left hand by two fellow-flintworkers of the old prehistoric dawn, is given by the Rev. William Greenwell, in a communication to the Ethnological Society of London, on the opening of some ancient flint pits, called "Grime's Graves," in Norfolk. The rude flint implements abundantly found in the course of his researches are such as are assigned to the

Neolithic age; and the bone implements which specially attract our interest now, fully accord with such a classification. In clearing out one of the subterranean galleries excavated in the chalk, it was found that "the roof had given way about the middle of the gallery, and blocked up the whole width of it. On removing this, it was seen that the flint had been worked out in three places at the end, forming three hollows, extending beyond the chalk face of the end of the gallery." In front of two of these hollows lay two picks, corresponding to others found in various parts of the shafts and galleries, made from the antler of the red deer. But in this case the writer notes that the handle of each was laid towards the mouth of the gallery, the tines, which formed the blades of the tools, pointing towards each other, "showing, in all probability, that they had been used respectively by a right and a left-handed man. The day's work over, the men had laid down each his tool, ready for the next day's work; meanwhile the roof had fallen in, and the picks had never been recovered."

The picks thus made from the antlers of the red deer were constructed simply by detaching the horn at a distance of about sixteen or seventeen inches from the brow end, and then breaking off all but the large brow-tine, with the help of fire and rude cutting implements of flint. They had been used both as picks and hammers, the point of the brow-tine serving for a pick, and the broad flat part opposite to it as a hammer, for breaking off and detaching the flint from the chalk; while excavations through the solid chalk were effected by means of hatchets of basalt. The marks of both tools were abundant on the walls of the galleries; and many of the rude picks, including the two specially referred to, were coated with an incrustation of chalk, bearing the impress of the workmen's fingers. Unfortunately this evidence, although so distinct as to show the print of the skin most apparent, does not appear to have been appealed to as the conclusive test of the right and left-handed workmen, by whom they were employed at the close of that last day's labour, in the prehistoric dawn. Here, however, the evidence, so far as it goes, leaves the right and left-handed workmen of that remote era with no determinate preference either way.

But one test of a very reliable kind proves the recognition of right-handedness among races in as primitive a condition as the rudest of the flint-folk of Europe's dawn. Even among the degraded Australians, and the Pacific Islanders, terms for right, the right-hand, or approximate expressions, show a familiarity with the distinction.

In the Kāmilarai dialect of the Australians bordering on Hunter's River and Lake Macquarie, *matara* signifies hand, but they have the terms *turovn*, right, on the right hand, and *ngorangón*, on the left hand. In the Wiraturai dialect of the Wellington Valley, the same ideas are expressed by the words *bumalgál* and *miraga*, *i. e.*, dextrorsum and sinistrorsum.

The idea which lies at the root of our own decimal notation, and has long since been noted by Lepsius, Donaldson and other philologists, as the source of names of Greek and Latin numerals, is no less discernible in the rudest savage tongues. Among the South Australians the simple names for numerals are limited to two, viz., *ryup*, one, and *politi*, two; the two together express three; *politi-politi*, four; and then five is indicated by the term *ryup-murnangin*, *i. e.*, one-hand; ten by *politi-murnangin*, *i. e.*, two hands. The same idea is apparent in the use (in the dialects of Hawaii, Raratonga, Viti, and New Zealand) of the common terms *lima*, *rima*, *linga*, *ringa*, &c., for *hand* and the number *five*. But *fulu*, and its equivalents, stand for *ten*, apparently from the root *fu*, whole, altogether; while the word *tau*, which in the Hawaiian signifies *ready*, in the Tahitian *right*, *proper*, and in the New Zealand *expert*, *dextrous*, is the common Polynesian term for the right-hand. In the Vitian language, as spoken in various dialects throughout the Viti or Fidji Islands, the distinction is still more explicitly indicated. There is first the common term *linga*, the hand, or arm; then the ceremonial term *daka*, employed exclusively in speaking of that of a chief, but which, it may be presumed, also expresses the right-hand: as, while there is no other word for it, a distinct term *sema* is the left-hand. The root *se* is found not only in the Viti, but also in the Samoa, Tonga, Mangariva, and New Zealand dialects, signifying to err, to mistake, to wander; *semo*, unstable, unfixed. But also there is the word *matau*, right, dexter, clearly proving the recognition of the distinction. Again, in the Terawan language, spoken throughout the group of islands on the equator, called the Kingsmill Archipelago, the terms *atai* or *edai*, right, dexter, (entirely distinct from *rapa*, good, right,) and *maan*, left, sinister, are applied to *bai*, or *pai*, the hand, to denote the difference, *e. g.*, *Te bai maan*, the left hand, *i. e.*, the dirty hand, that which is not used in eating.

Turning to the languages of the American continent, similar evidence reveals the recognition among its savage hunter-tribes of the distinction between the right and left hand. In the Chippeway the word for my

right hand is *ne-ke-che-neenj*, *ne* being the pronominal prefix, literally my great hand. My left hand is *ne-nuh-munj-neenj-ne*. *Nu-munj* is the same root as appears in *nuh-munj-e-doon*, I do not know; and the idea obviously is the uncertain, or unreliable hand. Again, in the Mohawk language, the right hand is expressed by the term *ji-ke-we-yen-den-dah-kon*, from *ke-we-yen-deh*, literally, "I know how." *Ji* is a particle conveying the idea of *side*, and the termination *dah-kon* has the meaning of "being accustomed to." It is, therefore, the limb accustomed to act promptly, the dextrous organ. *Ske-ne-kwa-dih* the left hand, literally means "the other side."

The American languages abound with examples of a decimal system of numerals traceable to the primitive mode of counting on the fingers. On the Labrador coast, *tallek*, a hand, also signifies five. Among the Muyska Indians the phrase for five is "hand finish." Ten is "two hands finished." The feet are then resorted to in similar fashion so as to express the numerals to twenty. This process was in use among the Caribs, and is common to widely severed races of the old and new world, with special modifications expressing the same recognition of the inferior rank of one hand in relation to the other, which is indicated in the classical *sinistra* as compared with the *dextera manus*.

The Anglo-Saxon equivalent terms are *swyðre* and *wynstre*, as in Matthew vi. 3: "Soðlice thonne thu thinne aelmessan do, nyte thin wynstre hwaet do thin swyðre;" "When thou doest alms, let not thy left hand know what thy right hand doeth." Again the distinction appears in a subsequent passage thus: "And he geset tha scep on hys swithran healf, and tha tycenu on hys wynstran healf." (Matt. xxv. 34.) Here the derivation of *swyðre* from *swyð*, strong, powerful, *swyðra*, a strong one, a dextrous man, *swyðre*, the stronger, the right hand, is obvious enough. It is also used as an adjective, as in Matthew v. 30: "And gif thin swyðre hand the aswice, aceorf hig of;" "And if thy right hand offend thee, cut it off." The derivation of *wynstre* is less apparent, and can only be referred to its direct significance, *se wynstra*, the left. In the isolated ἀριστερός, ἀριστερά, there is a comparative form, arising, it may be, from the depreciatory comparison between it and its more favoured brother, the δεξιά, or right-hand. This is obvious enough in the σκαιός, the left, the ill-omened, the unlucky; or, like the French *gauche*, awkward, clumsy, uncouth. The left arm was the shield-bearer; hence ἐπ' ἀσπίδα, on the left, &c.

In Scotland the older Gaelic has supplied the term *ker* or carry-handed, from *lamh-chearr*, the left hand. There is no separate word in the Gaelic for right hand, but it is called *lamh dheas* and *lamh cheart*. Both words imply *proper, becoming, or right, dheas, δεξιός; chearr, χάρτα, certus*. *Ceart* is the common term to express what is right, correct, or fitting, whereas *dheas* primarily signifies the *south*, and is explained by the supposed practice of the Druid augur following the sun in his divinations. In this it will be seen to agree with the secondary meaning of the Hebrew *Yamin*, and to present a common analogy with those of corresponding Greek and Latin terms hereafter referred to. *Deisal*, a compound of *dheas*, south, and *iùl*, a guide, a course, is commonly used as an adjective, to express a lucky or favourable occurrence. The left hand is variously styled *lamh chli*, the wily or cunning hand, and *lamh chearr*, or *chiotach*. *Cearr* is wrong, unlucky, and *chiotach* is the equivalent of *sinister*, formed from the specific name for the left-hand, *ciotag*, Welsh *chwithig*. There is no corresponding equivalent to express the right hand. According to Pliny (*Hist. Nat.* lib. xxviii. c. 2), "The Gauls, in their religious rites, contrary to the practice of the Romans, turned to the left," though the precise directions most favoured in Roman augury are subject to variable interpretation.

Adopting the Gaelic *cearr*, the lowland Scots use the term *ker*, or carry, for left-handed. In the secondary meanings attached to it, it signifies awkward, devious, and in a moral sense is applied in the same way as *sinister* in English. To "*gang the car gate*" is to go the left road, *i. e.*, the road to ruin. An ancient tradition, referred to by the elder Scottish historians, traces the surname of Kerr to the fact that the Dalriadic king, Kynach-Ker or Connehad Cearr, as he is called in the Duan Albanach, was left-handed. In some parts of Scotland, and especially in Lanarkshire, it is an evil omen to meet a carry-handed person when setting out on a journey. Jamieson notes the interjectional phrase *car-shamyè*, (Gaelic *sgeamh-aim*, to reproach,) as in use in Kinross-shire, in the favourite Scottish game of shintie, when an antagonist takes what is regarded as an undue advantage by using his club, or shintie, in the left hand. All this, while it indicates the exceptional character of left-handedness, clearly points to a habit of such frequent occurrence as to be familiarly present to every mind.

The idea of weakness, uncertainty, unreliability, attaching to the left hand, naturally leads to the tropical significance of unreliable,

untrustworthy, in a moral sense; and both ideas are found alike in barbarous and classical languages. An interesting example of the former occurs in Ovid's *Fasti*, iii. 869, where the poet speaks of the flight of Helle and her brother on the golden-fleeced ram, and describes her as grasping its horn "with her feeble left hand, when she made of herself a name for the waters," i. e., by falling off and being drowned:

"Utque fugam capiant aries nitidissimas auro  
Traditur; ille vehit per freta longa duos;  
Dicitur informis cornu tenuisse sinistra  
Femina cum de se nomina fecit aquæ."

In the depreciatory moral sense, Plautus, in the "*Persa*," ii. 2, 44, calls the left hand *furtifica*, thievish. "Estne hæc manus? Ubi illa altera est furtifica læva?" So in like manner the term in all its forms acquires a depreciatory significance, and is even applied to sinister looks.

Another line of investigation tends to confirm the idea of man having a preferential and more skilful hand at the earliest stage of his mastery of tools and implements of war or husbandry. The prevalence of a decimal system of numerals among widely severed nations, alike in ancient and modern times, has been universally ascribed to the simple process of counting with the aid of the fingers. Mr. Francis Galton, in his *Narrative of an Exploration in Tropical Africa*, when describing the efforts of the Damaras at computation, states that the mental effort fails them beyond *three*. "When they wish to express *four*, they take to their fingers, which are to them as formidable instruments of calculation as a sliding-rule is to an English school-boy. They puzzle very much after *five*, because no spare hand remains to grasp and secure the fingers that are required for units." Turning to the line of evidence which this primitive method of computation suggests, some striking analogies reveal a recognition of ideas common to the savage of the Polynesian archipelago and to the cultivated Greek and Roman. Donaldson, in *The New Cratylus*, in seeking to trace the first ten numerals to their primitive roots in Sanscrit, Zend, Greek and Latin, derives seven of them from the three primitive prenominal elements. But *five*, *nine* and *ten* are referred directly to the same infantile source of decimal notation, suggested by the ten fingers, as that which has been recognised in similar operation among the Hawaiians and New Zealanders. "One would fancy, indeed, without any particular investigation of the subject, that the number five would have some connec-



tion with the word signifying a hand, and the number ten with a word denoting the right hand; for in counting with our fingers we begin with the little finger of the left hand, and so on till we get to the little finger of the right hand." Hence the familiar idea, as expressed in its simplest form, where Hæsioid (Op. 740) calls the hand *πέταζον*, the five-branch; and hence also *πεμπάζω*, primarily to count on five fingers.

Bopp, adopting the same idea, considers the Sanscrit *pan'-chā* as formed of the copulative conjunction added to the neuter form of *pa*, one, and so signifying "and one." Benary explains it as an abbreviation of *pān'-i-cha*, "and the hand;" the conjunction being equally recognisable in *pan'-cha*, *quin-que*, and *πέντε*. This, they assume, expressed the idea that the enumerator then began to count with the other hand; but Donaldson ingeniously suggests the simpler meaning, that after counting four, the whole hand was opened and held up. To reckon by the hand was, accordingly, to make a rough computation, as in the "Wasps" of Aristophanes, where Bdelycleon bids his father, the Dicast, "first of all calculate roughly, not by pebbles, but, ἀπὸ χειρῶς, with the hand."

The relation of *δεξιά* to *δέξα* and *dextra*, *δέξα*-*a decem*; *δεξ-σιός*, *decster*, all illustrate the same idea. Grimm, indeed, says, "In counting with the fingers, one naturally begins with the left hand, and so goes on to the right. This may explain why, in different languages, the words for the left refer to the root of five, those for the right to the root of ten." Hence also the derivation of *finger*, through the Gothic, and Old High German, from the stem for five and left; while the Greek and Latin *δάκτυλος* and *digitus*, are directly traceable to *δέξα* and *decem*. The connexion between *ἀριστερά* and *sinistra* is also traced with little difficulty, the sibilant of the latter being ascribed to an initial digamma, assumed in the archaic form of the parent vocabulary. Nor is the relationship of *δεξιά* with *digitus* a far-fetched one. As the antique custom was to hand the wine from right to left, so it may be presumed that the ancients commenced counting with the left hand, in the use of that primitive abacus, finishing with the dexter or right hand at the tenth digit, and so completing the decimal numeration.

The inferior relation of the left to the right hand was also indicated in the use of the former for lower, and the latter for higher numbers beyond ten. In reckoning with their fingers, both Greeks and Romans counted on the left hand as far as a hundred, then on the right hand to two hundred, and so on alternately, the even numbers being always

reckoned on the right hand. The poet, Juvenal, refers to this in his tenth Satire, where, in dwelling on the attributes of age, he speaks of the centenarian, "who counts his years on his right hand."

"Felix nimirum, qui tot per sæcula mortem  
Distulit, atque suos jam dextra computat annos,  
Quique novum toties mustum bibit."

A curious allusion, by Tacitus, in the first book of his History, serves to show that the German barbarians beyond the Alps no less clearly recognised the significance of the right hand, as that which was preferred, and accepted as the more honourable member. The Lingones, a Belgian tribe, had sent presents to the Legions, as he narrates, and in accordance with ancient usage, gave as the symbolical emblem of friendship, two right hands clasped together. "Miserat civitas Lingonum vetere instituto dona legionibus, dextras, hospiti insigne." The dextræ are represented on a silver quinarius of Julius Cæsar, described in Ackerman's "Catalogue of rare and unedited Roman Coins," vol. i. p. 106.

Other evidence of a different kind confirms the recognition and preferential use of the right hand among our Germanic ancestors from the remotest period. Dr. Richard Lepsius, in following out an ingenious analysis of the primitive names for the numerals, and the sources of their origin, traces from the common Sanskrit root *daça*, Greek *δέξα*, through the Gothic *taihun*, the *hunda*, as in *two hunda*: two hundred. He next points out the resemblance between the Gothic *hunda* and *handus*, i. e., the hand, showing that this is no accidental agreement; but that the words are etymologically one and the same. The A. S. *hund*, a hundred, originally meant only ten, and was prefixed to numerals above twenty, as *hund eahtatig*, eighty, &c.

The whole argument, thus glanced at, proceeds on the assumption that right-handedness is natural, and of universal recognition. When we turn from purely philological to direct historical evidence, the proofs of its recognition are sufficiently distinct to leave no doubt on the mind. Oldest and clearest of all are the references in early Hebrew history. We learn from the Book of Judges (c. xx. v. 16), that in the tribe of Benjamin, out of twenty-six thousand men that drew the sword, there were "seven hundred chosen men, left-handed: every one could sling stones at a hair's breadth, and not miss." The skill thus ascribed to the left-handed Benjamites will properly come under review on a

later page, in considering how far this peculiarity is really abnormal. But other references suffice to show how thoroughly the distinction of right and left-handedness was recognized among the ancient Hebrews. Ehud, the deliverer of Israel from their servitude to Eglon, king of Moab, is noted as "a Benjamite, a man left-handed;" and in the act by which he delivered them from their oppressor, it is stated that he "put forth his left hand, and took the dagger from his right thigh," (Judges, c. iii. v. 21). Again it is recorded (1 Chron. xii. v. 2), when David was in hiding at Ziklag, there came to him a company of mighty men, "who were armed with bows, and could use both the right hand and the left in hurling stones and shooting arrows out of a bow." These latter, it will be observed, are not left-handed, but ambidextrous. Even among those who, by reason of a natural left-handedness, have ultimately acquired unwonted facility with both hands, it is rare indeed to find one who can use both the right and the left hand to throw a stone with equal force and precision.

But this leads to another inquiry, of no slight importance in reference to the whole bearing of the question. The application of the Latin *dexter* to right-handedness specifically, as well as to general dexterity in its more comprehensive significance, points, like the record of the old Benjamites, to the habitual use of one hand in preference to the other; but does it necessarily imply that *their* "right hand" was the one on that side which we now concur in calling dexter or right? In the exigencies of war or the chase, and still more in many of the daily requirements of civilized life, it is necessary that there should be no hesitation as to which hand shall be used. Promptness and dexterity depend on this, and no hesitation is felt. But, still further, in many cases of combined action, it is needful that the hand so used shall be the same; and wherever such a conformity of practice is recognized—as among the seven hundred slingers of the tribe of Benjamin,—the hand so used, whichever it be, is that on which their *dexterity* depends, and becomes practically the *right* hand. Curiously, indeed, the term *yamin* (the right hand) is the root of the proper name, Benjamin, *i. e.*, son of the right hand. It is derived from the verb *yāmān*, to be firm, to be faithful, as the right hand is given as a pledge of fidelity, *e. g.*, "The Lord hath sworn by his right hand" (Isaiah, lxii. 8). So in the Arabic form, *Bimin Allah*, by the right hand of Allah. Or again, as symbolical of treachery, "Their right hand is a right hand of falsehood," (Psalm cxliv. 8).

So also with the Hebrews and other ancient nations, as still among ourselves, the seat at the right hand of the host, or of any dignitary, was the place of honour: as when Solomon "caused a seat to be set for the king's mother, and she sat on his right hand" (1 Kings, ii. 19). Again: the term is frequently used in opposition to *semal*, left hand; as when the children of Israel would pass through Edom; "We will go by the king's highway; we will not turn to the right hand or to the left" (Numbers, xx. 17).

But a further use and significance of the terms helps us to the fact that the Hebrew *yamin* and our *right hand* are the same. In its secondary meaning it signified *the south*, as in Ezekiel, xlvi. 1: "The fore front of the house stood toward the east, and the waters came down from under, from the right side of the house, at the south side of the altar." The four points are accordingly expressed thus in Hebrew: *yamin*, the right, the south; *kedem*, the front, the east; *semol*, the left, the north; *achor*, behind, the west. To the old Hebrew, when looking to the east, the west was thus behind, the south on his right hand, and the north on his left. A different idea is illustrated by the like secondary significance of the Greek *αριστερος*, left, or on the left hand; but also used as *west*, or *westward*, as in the Iliad, 3, 149, *αριστερα πύλαι*, the west gate of Troy. The Greek augur, turning as he did his face to the northward, had the left—the sinister, ill-omened, unlucky side,—on the west. Hence the metaphorical significance of *ἀριστερος*, ominous, boding ill. With the Roman augur, the particular quarter of the heavens towards which he was to look appears to have been variable. Livy says the east, Varro the south, and Frontinus the west. Probably part of the augur's professional skill consisted in selecting the aspect of the heavens suited to the occasion. But this done, the flight of birds and other appearances on the right or on the left, determined the will of the gods. "Why," asks Cicero, himself an augur, "Why should the raven on the right, and the crow on the left, make a confirmatory augury?" "Cur a dextra corvus, a sinistra cornix faciat ratum?" (*De Divin.* I) The left was the side on which the thunder was declared to be heard which confirmed the inauguration of a magistrate, and in other respects the augur regarded it with special awe. But still the right side was, in all ordinary acceptance, the propitious one; as in the address to Hercules (*Æn.* viii. 302):

"Salve vera Jovis proles, pecus addito divis;  
Et nos et tua dexter adi pede sacra secundo."

The rites of the social board among the ancient Greeks required the passing of the wine from right to left—or, at any rate, in one invariable direction,—as indicated by Homer in his description of the feast of the gods, (*Iliad*, i. 597, *θεοῖς ἐνδέξια πᾶσι ψυχόμεν,*) where Hephaestus goes round and pours out the sweet nectar to the assembled gods. The direction pursued by the cup-bearer would be determined by his bearing the flagon in his right hand, and so walking from left to right, with his right hand towards the guests. This is, indeed, a point of dispute among scholars. But it is sufficient for our present purpose that a uniform practice prevailed, dependent on the recognition of right and left-handedness; and this is no less apparent among the Romans than the Greeks. It is set forth in the most unmusical of Horace's hexameters: "*Ille sinistrorsum, hic dextrorsum abit;*" and finds its precise elucidation from many independent sources: in the allusions of the poets, in the works of the sculptors, and the decorations of fictile ware. The determination of the actual right and left of the Greeks and Romans, as of other nations, in order to ascertain if they were the same as our own, is important in relation to the whole bearing of this inquiry. But the true direction of the Hebrew right and left has a special significance, in view of the fact that whilst the great class of Aryan languages, including the ancient Sanscrit, Greek and Latin, appear to have been written from left to right, and the same characteristic is common to the whole alphabets and writings of India, all the Semitic languages, except the Ethiopic, are written from right to left. This uniform habit has so largely affected our current handwriting, and modified its forms into those best adapted for rapid and continuous execution in the one direction, that its reversal at once suggests the idea of its origination among a left-handed people. But there is no true ground for this. So long as each character was separately drawn, and when, moreover, they were pictorial or ideographic, it was, in reality, more natural to begin at the right, or nearer side, of the papyrus or tablet, than to pass over to the left. The direction of the writing only becomes significant in reference to a current hand. The older Greek fashion of boustrophedon, or alternating, like the course of oxen in ploughing, still more strongly illustrates the natural process of beginning uniformly at the side nearest to the hand; nor did either this, or the still earlier mode of writing in columns, as with the ancient Egyptians, or the Chinese, present any impediment, so long as it was executed in detached characters.

The materials in use by the scribe necessarily affect the forms in use. So soon as the reed or quill, with the coloured liquid or pigment, took the place of the chisel, or style, and the papyrus was substituted for the stone tablet or metal plate, a complete revolution followed in the form of phonetic or alphabetic signs. The process may be seen in the modern student's first efforts at writing Greek, with the gradual adoption of tied letters, and the requisite modifications of intractable characters, such as the *lambda* and *chi*, which do not readily conform to the slope or fashion of modern epistolography. So soon as the Egyptians adopted the reed and papyrus, the hieratic writing began to be modified in this fashion; and when it passed into the demotic handwriting, the same influences were at work which control the modern penman in the slope, direction and force of his stroke, with one important exception. To the last their enchorial or demotic writing was mainly executed in detached characters, and does not, therefore, constitute a true current hand-writing, such as in our own continuous penmanship leaves no room for doubt as to the hand by which it was executed. Any sufficiently ambidextrous penman, by applying the practical test of attempting to copy a piece of modern current writing with either hand, would determine beyond all question its right-handed execution. But no such certain result is found on applying the same test to the Egyptian demotic. I have ascertained by experiment on two of the Louvre demotic MSS. and a portion of a Turin papyrus, that they can be copied with nearly equal dexterity with either hand. Some of the characters are more easily and naturally executed, without lifting the pen, with the left hand than the right. Others again, in the slope and the direction of the thickening of the stroke, suggest a right-handed execution; and this is more apparent in some other examples both of hieratic and demotic writing. But habit in the forming of the characters, as in writing Greek, or Arabic, would so speedily overcome any difficulty either way, that I feel assured no habitually left-handed writer would find any difficulty in acquiring the unmodified demotic hand; whereas no English penman compelled to resort to the left hand in executing the ordinary current transcription, however great might be his acquired dexterity, could fail to indicate the change, in the slope, the stroke, and the formation of the letters.

So far as pure hieroglyphics are concerned, especially as most commonly executed in mural inscriptions, they frequently present features calculated to suggest the idea that the Egyptians were a left-handed

people; and this is even more strongly suggested by other evidence. Nevertheless the peculiarities appear to be satisfactorily accounted for on other grounds. The normal way of writing the hieroglyphics appears to have accorded with that of the Hebrew and other semitic languages, though examples do occur of true hieroglyphic papyri written from left to right. But the more direct test is dependent on the pictorial character of such writings. It is easier for a right-handed draftsman to draw a profile with the face looking towards the left, and the same influence might be anticipated to affect the direction of the characters incised on the walls of temples and palaces; so that this seems to offer an available test of Egyptian right or left-handedness. But the evidence derived from Egyptian monuments is liable to mislead. A writer in *Nature* (J. S., April 14th, 1870,) states as the result of a careful survey of the examples in the British Museum, that the hieroglyphic profiles there generally look to the right, and so suggest the work of a left-handed people. Other and more suggestive evidence from the monuments of Egypt points to the same conclusion, but it is deceptive. If, for example, the inquirer examine two columns of hieroglyphics running down the front, or cover, of the great sarcophagus of "Sarcoph of Sebaksi, priest of Phtha," in the British Museum, he will find that the profiles in each column look towards the centre line. This is a key to the direction of Egyptian profiles, both in sculpture and hieroglyphics. It appears to have been mainly determined by the relation of each to the architectural details of the façades which they so largely contributed to enrich, and hence any inference based on the direction of detached examples is apt to mislead.

In discussing the character of the Palenque hieroglyphics of Central America, at an earlier date, the bearing of this class of evidence on the question under consideration was thus set forth: "It is noticeable that in the frequent occurrence of human and animal heads among the sculptured characters, they invariably look towards the left: an indication, as it appears to me, that they are the graven inscriptions of a lettered people, who were accustomed to write the same characters from left to right on paper or skins. Indeed, the pictorial groups on the Copan statues seem to be the true hieroglyphic characters; while the Palenque inscriptions show the abbreviated hieratic writing. To the sculptor the direction of the characters was a matter of no moment; but if the scribe held his pen or style in his right hand, like the modern

clerk, he would as naturally draw the left profile as we slope our current hand to the right."\*. In the pictorial hieroglyphics, reproduced in Lord Kingsborough's *Mexican Antiquities*, as in other illustrations of the Arts of Mexico and Central America, it is also apparent that the battle-axe and other weapons and implements are most frequently held in the right hand. But to this exceptions occur; and it is obvious that the crude perspective of the artist influenced the disposition of the tools, or weapons, according to the action designed to be represented, and the direction in which the actor looked.

If the difficulties of foreshortening and general perspective are overlooked, and the decorative value of the hieroglyphics in Egyptian architecture is left out of account, the evidence they afford in reference to the right or left-handedness of their executors is of a conflicting nature. The conclusion drawn by one observer from a study of the extensive collection of the British Museum, as we have seen, is that the prevailing direction of the profiles is as a left-handed draughtsman would represent them. But the result of more extended observation shows that the direction of the profiles, and of hieroglyphics generally, is due to totally different causes, and depended on their relation to the general architectural design, or to the principal figures to which they refer. This is borne out by ample evidence to be found in Champollion's *Monuments de l'Égypte et de la Nubie*; and is fully confirmed by Maxime Du Camp's "Photographic Pictures of Egypt, Nubia, &c.;" by Sir J. Gardner Wilkinson's "Manners and Customs of the Ancient Egyptians;" and by other photographic and pictorial evidence. In a group, for example, photographed by Du Camp, from the exterior of the sanctuary of the Palace of Karnak, where the Pharaoh is represented crowned by the ibis and hawk-headed deities, Thoth and Horus, the hieroglyphics are cut on either side so as to look towards the central figure. The same arrangement is repeated in another group at Ipsamboul, engraved by Champollion, *Monuments de l'Égypte*, Tome prem. pl. v. Still more, where figures are intermingled, looking in opposite directions—as shown in a photograph of the elaborately sculptured posterior façade of the Great Temple of Denderah,—the accompanying hieroglyphics, graven in columns, vary in direction in accordance with that of the figure to which they refer. Columns of hieroglyphics repeatedly occur, separating the seated deity and a worshipper standing before him, and only divided by a perpendicular line, where the charac-



ters are turned in opposite directions corresponding to those of the immediately adjacent figures.

I have dwelt on this question of the direction of the hieroglyphic characters with some minuteness, because the proof of a uniform adherence to either direction would have tended strongly to sustain the idea of their being the work of a right or of a left-handed people. The whole question might indeed seem to be settled beyond dispute, by the repeated representations both of gods and men, engaged in the actual process of writing. Among the incidents introduced in the oft-repeated judgment scene of Osiris—as on the Adytum of the Temple of Dayr el Medineh, of which I have a photograph,—Thoth, the Egyptian God of Letters, stands with the stylus in his left hand, and a papyrus or tablet in his right, and records against the deceased, in the presence of the divine judge, the results of the literal weighing in the balance of the deeds done in the body.

So conclusive does this and other monumental evidence seem, in proof of the assumption that the Egyptians were a left-handed people, that, on writing to an Egyptian traveller, who has spent successive winters on the Nile, photographed its temples, and brought home paper casts of the Judgment of Osiris at Dayr el Medineh, as well as of other sculptured scenes, he referred to it as decisive. He thus writes: "I have looked over my photographs, casts, and paper impressions of subjects on the walls of temples and tombs in Egypt and Nubia, and I find in them that the left hand is always used where we use the right. On the wall of the Temple of Karnac, Thotmes III. is represented making an offering contained in a vase. His right side is towards the looker-on, but he holds the vase on the palm of the left hand, which is extended at arm's length." He then refers to the Judgment scene at Dayr el Medineh, and adds, "In other smaller representations of the same Judgment scene, Thoth is always represented holding the style in his left hand. In the sculpture on the wall of the great chamber in the rock-temple of Abou Simbel, Rameses is represented slaying his enemies with a club, which is held in his left hand. In the sculptures of Pasht, she is represented decapitating her prisoners with a scimitar, which is always held in the left hand." The evidence thus adduced seems so direct and indisputable as to settle the question; yet further research leaves on my mind no doubt that it is illusory.

When, as in the Judgment scene at El Medineh and elsewhere, Osiris is seated looking to the right, Thoth faces him holding in the

off-hand—as more extended, by reason of the simple perspective,—the papyrus or tablet; while the pen or style is held in the near or left hand; to have placed the pen and tablet in the opposite hand, would have required a complex perspective and foreshortening, or would have left the whole action obscure and unsuited for monumental effect. Nevertheless, the difficulty is overcome in repeated examples: as in a repetition of the same scene engraved in Sir J. Gardner Wilkinson's "Manners and Customs of the Ancient Egyptians" (pl. 88), and on a beautifully executed papyrus, part of "The Book of the Dead," now in the Louvre, and reproduced in facsimile in Sylvestre's *Universal Palæography* (vol. i. pl. 46), in both of which Thoth holds the pen or style in the right hand. The latter also includes a shearer holding the sickle in his right hand, and a female sower, with the seed-basket on her left arm, and scattering the seed with her right hand. Examples of scribes, stewards, and others engaged in writing, are no less common in the scenes of ordinary life; and though when looking to the left, they are, at times, represented holding the style or pen in the left hand, yet the great preponderance of evidence suffices to refer this to the exigencies of primitive perspective. The steward in a sculptured scene from a tomb at Elethya (*Monuments de l'Égypte*, pl. 142), receives and writes down a report of the cattle from the field servants, holding the style in his right hand, and the tablet in his left. So is it with the registrar and the scribes (*Wilkinson*, figs. 85, 86); the steward who takes account of the grain delivered (fig. 387), and the notary and scribes (figs. 73, 78), all from Thebes; where they superintend the weighing at the public scales, and enumerate a group of Negro slaves.

In the colossal sculptures on the façades of the great temples, where complex perspective and foreshortening would interfere with the architectural effect, the hand in which the mace or weapon is held appears to be mainly determined by the direction to which the figure looks. At Ipsamboul, as shown in *Monuments de l'Égypte*, pl. 11, Rameses grasps with his right hand, by the hair of the head, a group of captives of various races, negroes included, while he smites them with a scimitar or pole-axe, wielded in his left hand; but an onlooker, turned in the opposite direction, holds the sword in his right hand. This is still more markedly shown in two scenes from the same temple (pl. 28). In the one Rameses, looking to the right, wields the pole-axe in the near or right hand, as he smites a kneeling Asiatic; in the other, where he

looks to the left, he holds his weapon again in the near, but now the left hand, as he smites a kneeling negro. On the same temple soldiers are represented holding spears in the near hand, right or left, according to the direction they are looking (pl. 22); and swords and shields are transposed in like manner (pl. 28). The same is seen in the siege scenes and military reviews of Rameses the Great, on the walls of Thebes and elsewhere.

In the example from Karnac,—appealed to in proof that the Egyptians were a left-handed people,—where Thotmes III. holds his offering in the extended left hand, his right side is stated to be towards the observer. Nor are similar examples rare. Thoth and other deities, sculptured in colossal proportions, on the Grand Temple of Isis, at Philæ, as shown by Du Camp, in like manner have their right sides towards the observer, and hold each the mace or sceptre in the extended left hand. But on turning to the photographs of the Great Temple of Denderah, where another colossal series of deities is represented in precisely the same attitude, but looking in the opposite direction, the official symbols are reversed, and each holds the sceptre in the extended right hand. Numerous similar instances are given by Wilkinson; as in the dedication of the pylon of a temple to Amun by Rameses III. Thebes (No. 470); the Goddesses of the West and East, looking in corresponding directions (No. 461), &c.

Examples, however, occur where the conventional formulæ of Egyptian sculpture have been abandoned, and the artist has overcome the difficulties of perspective; as in a remarkable scene in the Memnonium, at Thebes, where Atmoo, Thoth, and a female (styled by Wilkinson the Goddess of Letters), are all engaged in writing on the fruit of the Persæa tree the name of Rameses. Though looking in opposite directions, each holds the pen in the right hand (Wilkinson, pl. 54 A). So also at Beni Hassan, two artists kneeling in front of a board, face each other, and each paint an animal, holding the brush in the right hand. At Medinet Habou, Thebes, *more than one scene of draught-players* occurs, where the players, facing each other, each hold the piece in the right hand. Similar illustrations might be greatly multiplied; but while definite evidence of this kind clearly indicates right-handedness, it is obvious that the Egyptian monumental evidence, as a whole, must be employed with cautious discrimination, before its true bearing can be determined.

Among another people, of kindred artistic skill, whose monumental records have been brought anew to light in very recent years, similar

evidence appears to furnish somewhat more definite results; while proof of a wholly different kind leaves no room to doubt that among them a specific hand was recognized as that which every child learned to prefer so soon as reason assumed its sway. When the prophet had proclaimed the destruction of Nineveh, and resented the Divine mercy to its repentant people which seemed to falsify his message, the lesson taught him by his withered gourd is thus set forth: "And should not I spare Nineveh, that great city, wherein are more than six score thousand persons that cannot discern between their right hand and their left?" *i. e.*, young children. That the Ninevites and the ancient dwellers on the Euphrates and the Tigris were a right-handed people, appears to be borne out by their elaborate sculptures, recovered by Botta and Layard at Kourjunjik, Khorsabad, Nimroud, and other buried cities of the great plain. The sculptures are in relief, and frequently of a less conventional character than those of the Egyptian monuments, and are consequently less affected by the aspect and position of the figures. The gigantic figure of the Assyrian Hercules—or, as supposed, of the mighty hunter, Nimrod,—found between the winged bulls, in the great court of the Palace of Khorsabad, is represented strangling a young lion, which he presses against his chest with his left arm, while he holds in his right hand a weapon of the chase, which has been supposed to be analogous to the Australian boomerang. On the walls of the same palace the great king appears with his staff in his right hand, while his left hand rests on the pommel of his sword. Behind him a eunuch holds in his right hand, over the king's head, a fan or fly-flapper, and so with the other officers in attendance. Soldiers bear their swords and axes in their right hands, and their shields on their left. A prisoner is being flayed alive by an operator who holds the knife in the right hand. The king himself puts out the eyes of another captive, holding the spear in his right hand, while he retains in his left the end of a cord attached to his victim. Similar evidence abounds throughout the elaborate series of sculptures in the British Museum and in the Louvre. Everywhere gods and men are represented as "discerning between their right hand and their left," and giving the preference to the right.

It thus appears, so far as enquiry has been carried, that everywhere, from the earliest times, any definite information that can be recovered points to the preferential use of the right hand. The ancient Egyptian, Hebrew and Assyrian, the Greek and Roman, and seemingly also the

lettered Mexican of the New World, are all found following a uniform practice. So far as it can be discerned in the action of savage races, the same preference appears; so that, unless we assume the transmission of a primeval usage through all the ramifications of descent from a common ancestry, we must look for some congenital source for such predominating uniformity of law.

Yet this apparent uniformity of practice is not without very notable exceptions, the extent of which still remains to be determined. While right-handedness everywhere predominates, left-handedness is nowhere unknown. The ambidextrous skill of the combatant is indeed a favourite topic of poetic laudation; as in the combat between Entellus and Dares (*Æn.* v. 457) Where the passionate Entellus strikes, now with his right hand, and again with his left:

“Præcipitomque Daren ardens agit æquore toto,  
Nunc dextra ingeminans ictus nunc ille sinistra.”

But the more general duty of the left hand is as the shield-bearer, as where Æneas gives the signal to his comrades, in sight of the Trojans (*Æn.* x. 260):

“Stans celsa in puppi, clipeum cum deinde sinistra  
Extulit ardentem.”

The right hand may be said to express all active volition and all beneficent action, as in *Æn.* vi. 370, “Da dextram misero,” “Give thy right hand to the wretched,” *i. e.*, give him aid; and so in many other examples, all indicative of right-handedness as the rule. The only exception I have been able to discover occurs in a curious passage in the Eclogues of Stobæus, *περὶ φύλης*, in a dialogue between Horus and Isis, where, after describing a variety of races of men, it thus proceeds: τοὺς δὲ ἐν τῷ λιβὶ ἀσφαλεῖς εἶναι καὶ ὡς ἐπὶ τὸ πλεῖστον ἀριστερομάχους, καὶ ὅσον ἄλλοι τῷ δεξιῷ μέρει ἐνεργοῦσιν, αὐτοὺς τῷ εὐωνύμῳ προστιθεμένους, *i. e.*, “While those on the south-west are sure-footed, and for the most part fight with the left hand; and as much force as others exert with their right side, they exert by the application of their left.” Stobæus, the Macedonian, belongs, at earliest, to the end of the fifth century of our era, but he collected diligently from numerous ancient authors, some of whom would otherwise be unknown; and here he gives us the only indication of a belief, however vague, in the existence of a left-handed people.

As to the existence of individual examples of left-handedness, the proofs are abundant, alike in ancient times and in our own day.

Hyrtl affirms its prevalence in the ratio of only two per cent. But among the old Benjamites, and the Hebrews generally, it must have been more common; nor can I doubt that the tendency of a high civilization must be to diminish its manifestation. My own attention has been long familiarly directed to it from being myself naturally left-handed, and the experience of upwards of half a century enables me to controvert the belief expressed by Dr. Humphry, on which he founds the deduction that the superiority of the right hand is not congenital, but acquired, viz., that "the left hand may be trained to as great expertness and strength as the right." My own experience accords with that of others in whom inveterate left-handedness exists, and shows the education of a life-time contending with only partial success to overcome an instinctive natural preference. The result has been, as in all similar cases, to make me ambidextrous, yet not strictly speaking ambi-dexterous!

The direct value of such personal experience in determining *some* of the questions under consideration must be the excuse for a brief reference to its teachings. With an instinctive preference for the left hand, which equally resisted remonstrance, proffered rewards, and coercion, the writer nevertheless learned to use the pen in the right hand, apparently with no greater effort than other boys who pass through the preliminary stages of the art of penmanship. In this way the right hand was thoroughly educated, but the preferential instinct remained. The slate-pencil, the chalk, and pen-knife, were still invariably used in the left hand, in spite of much opposition on the part of teachers; and in later years, when a strong taste for drawing has been cultivated with some degree of success, the pencil and brush are nearly always used in the left hand. At a comparatively early age the awkwardness of using the spoon and knife at table, in the left hand, was perceived and overcome. Yet even now, when much fatigued, or on occasion of any unusual difficulty in carving a joint, the knife is instinctively transferred to the left hand. Alike in every case where unusual force is required, as in driving a large nail, wielding a heavy tool, or striking a blow with the fist, and in any operation demanding unusual delicacy, the left hand is employed. Thus, for example, though the pen is invariably used in the right hand in penmanship, the crow-quill and etching needle are no less uniformly employed in the left hand. Hence, accordingly, on proceeding to apply the test of the hand to the demotic writing of the Egyptians, by copying

rapidly the Turin enchorial papyrus already referred to, first with the right hand and then with the left, while some of the characters were more accurately rendered as to slope, thickening of lines, and curve, with the one hand, and some with the other, I have found it difficult to decide on the whole as to which hand executed the transcription with greatest ease. In proof of the general facility thus acquired, I may add that I find no difficulty in drawing at the same time, with a pencil in each hand, profiles of men or animals facing each other; but the attempt to draw different objects: as a dog's head with the one hand and a human profile with the other, is unsuccessful, owing to the complex mental operation involved. There is thus here what to an ordinary observer would appear to be thorough ambi-dexterity. Nevertheless, while there is little less command of the right hand than in the case of one exclusively right-handed, it is wholly acquired; nor has the habit of half a century overcome the preferential use of the other hand. It may be added that the same influences appear to affect the whole left side, as shown in hopping, skating, foot-ball, &c.

An exaggerated estimate is formed of the difficulties experienced by a left-handed person in the use of a screw-driver, gimlet, scissors, &c. "From the opening of the parlour door to the opening of a pen-knife," says Sir Charles Bell, "his disadvantage is apparent." Much of this is founded in misapprehension. With rare exceptions, habit so entirely accustoms him to the requisite action, that he would be no less put out by the sudden reversal of the door-handle, knife-blade, or screw, than the right-handed man. Habit is thus constantly mistaken for nature. The laws of the road, so universally recognized in England, have become to all as it were a second nature; and as the old rhyme says:

"If you turn to the left, you are sure to be right;  
If you turn to the right, you are wrong."

Yet throughout British America and the United States, the reverse is the law; and the new immigrant, adhering to the usage of the mother country, is sorely perplexed by the persistent wrong-headedness, as it seems, of everyone but himself.

Yet the predominant practice does impress itself on some few implements in a way sufficiently marked to remind the left-handed operator that he is transgressing normal usage. The snuffers are so peculiarly right-handed as to involve difficulty and awkwardness in spite of the dextrous shift of inserting the left thumb and finger below, instead of

above. The mower's scythe must be used in a direction in which the left hand is placed at some disadvantage ; but, like the handling of the oar or canoe-paddle, this difficulty is soon overcome. Even the musket or rifle is designed for a right-handed marksman. It is not uncommon to find a left-handed soldier placed on the left of his company when firing. The writer's own experience in drilling as a volunteer was that, after a little practice, he had no difficulty in firing from the right shoulder ; but never could acquire an equal facility with his companions in unfixing the bayonet and returning it to its sheath.

Some cases appear to indicate the hereditary transmission of left-handedness, and on this point further research is very desirable. In my own case a paternal uncle was left-handed. In that of a former pupil, Dr. R. A. Reeve, in whom an original left-handedness has been transmuted into a ready facility with both hands, he informs me that his father was left-handed. Another and more remarkable case has been reported to me of a gentleman in Shropshire, whose father and grandfather were both left-handed. His mother, on noticing an early manifestation of the same tendency in him, employed every means to counteract it. His left hand was bound up or tied behind him so perseveringly, that she only desisted at last under the fear that the left arm had been permanently injured by the constraint to which it had been subjected. Yet all proved in vain. The boy resumed the use of the left hand so soon as restraint was removed ; and though learning, like others, to use his right hand in many things, he remains inveterately left-handed. No doubt other cases of a similar character will be found on inquiry.

The conclusion I am led to form, as the result of long observation, is, that with a certain number of persons, the preferential use of the right hand is natural and instinctive ; that with a smaller number, an equally strong impulse is felt, prompting to the use of the left hand ; but that with the great majority right-handedness is mainly, if not solely, the result of education. If children are watched in the nursery, it will be found that the left hand is offered little less freely than the right. The nurse or mother is constantly transferring the spoon from the left to the right hand ; correcting the defective courtesy of the proffered left hand ; and in all ways superinducing right-handedness as a habit. As soon as the child is old enough to be affected by such influences, the fastening of its clothes, the handling of its knife and fork, and many other objects in daily use, help to confirm the habit



until the art of penmanship is mastered, and with this crowning accomplishment—except in cases of strongly marked bias in an opposite direction,—the left hand is relegated to its very subordinate place as a mere supplementary organ, to be called into use where the privileged member finds occasion for its aid.

Hence I believe the statistics of right and left-handedness will be found to vary considerably in different conditions of society and ranks of life. Few rustic operations more markedly betray the inconvenience of left-handedness than those of the harvest field; yet so far as my own observation extends, a large field of reapers will rarely be found without one or two left-handed shearers among them. Indeed the greater number of examples of female left-handedness which I can call to remembrance are those I have seen in the harvest field. The importance attached to habits at table, and the enforced uniformity of action by the tutor or governess, tend, in a higher class, to eliminate all but the most inveterate inclination towards a deviation from the practice of the majority. No governess, I imagine, would tolerate the needle in the left hand, any more than a writing-master would allow the pen to be so used. Hence the whole tendency of education is to eradicate or reduce to the lowest minimum all such sinister proclivities; whereas in savage and even in rustic life, any strong bias will be slightly interfered with; and so the left-handed impulse will be free to manifest itself to the utmost. But so soon as combined operations are reduced to any system, the convenience of a uniform preference of the same hand must be felt; and then whatever tendency affects the greater number will give the law to all.

So far as enquiry reaches, we have no evidence of any left-handed tribe or nation, savage or civilized, unless the vague allusion of Stobæus—already quoted,—to a sure-footed and left-handed race, be considered an exception. Either, therefore, the preferential use of the right hand is natural and congenital in a sufficiently large majority of the whole human race to determine everywhere its predominance, or else the arbitrary usage, developed into a habit and recognized law, has been derived from some primitive common source. The latter is a tempting argument, not without its weight in reference to the unity and common intellectual inheritance of the human race. But, notwithstanding the apparent failure of the evidence advanced in favour of an organic oneness finding expression in the prevalent use of the right hand, my own experience of the unconquerable impulse to prefer the left hand,

convinces me that a similar and more general bias in an opposite direction has its origin in organic structure.

The dexterity occasionally manifested by left-handed performers is sometimes regarded with surprise, as though it were accomplished under unusual disadvantages. But such skill as that of the left-handed slingers of the tribe of Benjamin is in no way exceptional. All truly left-handed, as well as all truly right-handed persons, are more likely to be *dextrous* than those who are unconscious of any strong impulse to the use of either hand. The bias, whether to the right or the left, is the result of special organic aptitude. With the majority no well-defined bias betrays any unwonted power, and they merely follow in this, as in so much else, the practice of the greater number. But there is no such difference between the two hands as to justify the extent to which, with the great majority, one is allowed to become a passive and nearly useless member. The left hand ought to be educated from the first no less than the right, instead of leaving its training to be effected, imperfectly and with great effort, in later life, to meet some felt necessity. In certain arts and professions, both hands are necessarily called into play. The skilful surgeon finds an enormous advantage in being able to transfer his instrument from one hand to the other. The *acoucheur* is no less indebted in critical cases to the prompt command of the left hand. The dentist has to multiply instruments to make up for the lack of such acquired power. The turner, the cabinet-maker, the chacer and die-cutter, who have mastered the same ambidexterity, all experience thereby greater facility in executing some portions of their work. The boxer has to learn the free use of his left hand. The fencer who can transfer his weapon to it, places his adversary at great disadvantage. The lumberer finds the operations of his wood-craft facilitated by learning to chop timber right and left-handed; and the carpenter may be frequently seen using the saw and hammer in either hand, and thereby not only resting his arm, but greatly facilitating his work. In all the fine arts the mastery of both hands is advantageous. The sculptor, the carver, and draftsman, the engraver, and cameo-cutter, each has recourse at times to the left hand for special manipulative dexterity; the pianist depends little less on the left hand than the right; and as for the organist, with the numerous pedals and stops of the modern grand organ, a quadrumanous musician would still find reason to envy the ampler scope which Briareus could command.

In every occupation which admits of the advantageous employment of both hands, the left-handed person has this advantage that, starting as he does with a natural facility in the use of the one hand, many circumstances compel him to the education of the other, and thus he becomes practically ambidextre, or not unfrequently learns to delegate special operations to each hand, as those for which experience and training have best adapted it. Nevertheless the instinctive preference is never eradicated. In every sudden and unpremeditated action the prompt use of the left hand shows that there remains, after the utmost educational training, some inherent impulse, resulting in a greater aptitude in the one hand than the other.

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## NOTES ON STATICS.

BY JAMES LOUDON, M.A.,

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The following Geometrical proofs of some propositions in Statics were devised by me in the year 1868 :

1. Let  $OA = r$  be any line;  $P_1, P_2, \dots$  the forces under which a system is kept at rest;  $\theta_1, \theta_2, \dots$  the angles between their directions and  $OA$ .

Then forming a closed polygon with the lines representing the forces, and projecting the sides on  $OA$ , we have  $\Sigma(P \cos \theta) = 0$ , and therefore  $\Sigma(Pr \cos \theta) = 0$ , that is,

$$P_1 \cdot r \cos \theta_1 + P_2 \cdot r \cos \theta_2 + \dots = 0.$$

But  $r \cos \theta$  is the projection of  $OA$  on the line inclined to it at angle  $\theta$ . Wherefore, &c.

2. Let the forces  $P_1, P_2, \dots$  be in equilibrium, or reducible to a single resultant.

Let  $p_1$  be the perpendicular from  $O$  on  $P_1$ ,  $\delta_1$  the perpendicular from  $A$  on the plane of  $p_1$  and  $P_1$ , &c.

Then forming a closed polygon with the axes of the couples, and projecting the sides on the line  $OA$ , we have  $P_1 p_1 \cos \theta_1 + \dots = 0$ . But  $\delta = OA \cos \theta_1$ , &c.; therefore  $P_1 p_1 \delta_1 + \dots = 0$ , or  $\Sigma(Pp\delta) = 0$ .

3. Let a set of forces be reducible to a resultant  $R$  acting along  $OA$  and a couple  $G$ , axis parallel to  $OB$ .

Then these can be transformed into  $R$  acting at a point  $O'$  and a couple  $G'$ , axis parallel to  $OO'$ , only when the plane  $BOO'$  is perpendicular to the plane  $AOO'$ , that is, when

$$\cos AOB = \cos AOO' \cdot \cos BOO',$$

as is evident by describing a sphere round  $O$ .

4. To find the positions of the momental-planes as the moment-centre (the origin) moves along a given line  $OA$ .

Here the forces are supposed reduced to  $R$  at  $O$  and a couple  $G$ , whose plane, the momental plane, passes through  $O$ .

Let  $OA$  and  $R$  be in the plane of the paper,  $OB$  the intersection of the momental-plane with the plane of the paper, and  $OC$  the projection of the axis of  $G$  on the plane of the paper.

Let  $O'$  be the new position of the origin on  $OA$ ,  $OO' = r$ ,  $d =$  distance of  $O'B'$ , parallel to  $OB$ , from  $OB$ ;  $\theta, \varphi, \psi$  the angles which the direction of  $R$ , the axis of  $G$ , and  $OC$  make, respectively, with  $OA$ .

Then on transferring to  $O'$  we have  $R$  and the couples  $G, Rr \sin \theta$ , the resultant of which will be a couple whose axis lies in a plane parallel to  $OC$  and perpendicular to the plane of the paper.

Now let  $s =$  distance of the line of intersection of the momental-planes at  $O$  and  $O'$  from  $O$ ;  $\alpha$  the angle between  $OC$  and axis of  $G$ ,  $\beta$  the angle between the momental-planes at  $O$  and  $O'$ ,  $\gamma$  the angle between the momental plane at  $O'$  and the plane of the paper.

Then  $s \cos (\alpha + \gamma) = d \cos (\alpha + \beta)$ , or  $s \sin \beta = d \sin \gamma$

$$\therefore s = d \frac{\sin \gamma}{\sin \beta} = d \cdot \frac{G}{Rr \sin \theta} = r \cos \psi \frac{G}{Rr \sin \theta} = \frac{G \cos \psi}{R \sin \theta},$$

which is independent of the distance of  $O'$  from  $O$ .

Therefore, as the moment-centre moves along  $OA$ , the momental-planes all pass through the same line, the distance of which from

$$O = \frac{G \cos \psi}{R \sin \theta}.$$

If a plane be drawn through this line parallel to the plane of the paper, and  $p =$  distance between these planes, then

$$p = s \cos \alpha = \frac{G \cos \psi \cos \alpha}{R \sin \theta} = \frac{G \cos \phi}{R \sin \theta},$$

since  $\cos \phi = \cos \psi \cos \alpha$ .

Therefore the above line may also be determined by the intersection of the momental-plane at  $O$  with a plane parallel to the plane of the paper at a distance  $= \frac{G \cos \phi}{R \sin \theta}$ .

The line so determined and  $OA$  are said to be *reciprocal* to one another.

4. When  $R$  at  $O$  and the couple  $G$  are replaced by two forces, one of which acts along the line  $OA$ , to find the magnitude and line of action of the other.

Let the forces of  $G$  be  $S$  acting along  $OB$ , and  $S$  at a distance  $\frac{G}{S}$ , the figure being the same as in previous proposition.

Now if the resultant of  $R$  and  $S$  at  $O$  acts along  $OA$ , we must have  $R \sin \theta = S \cos \psi$

$$\therefore S = \frac{R \sin \theta}{\cos \psi},$$

and therefore the other force acts at a distance  $= \frac{G \cos \psi}{R \sin \theta}$ , that is, along the reciprocal of  $OA$ .

$$\begin{aligned} \text{The resultant of } R \text{ and } S \text{ at } O &= R \cos \theta + S \sin \psi \\ &= \frac{R \cos (\theta - \psi)}{\cos \psi} \end{aligned}$$

Therefore the two forces are

$$\frac{R \cos (\theta - \psi)}{\cos \phi} \text{ along } OA,$$

$$\text{and } \frac{R \sin \theta}{\cos \psi} \text{ along its reciprocal.}$$

5. If  $\beta$  be the angle between the axis of  $G$  and the direction of  $R$ , the values of the forces may be written

$$\frac{R \cos \beta}{\cos \phi} \text{ along } OA,$$

and  $\frac{R}{\cos \phi} \{ \cos^2 \phi + \cos^2 \beta - 2 \cos \beta \cos \theta \cos \phi \}^{\frac{1}{2}}$  along its reciprocal.

6. The shortest distance between the reciprocal lines is evidently  $p$  already found in § 4 to be

$$\frac{G \cos \phi}{R \sin \theta}.$$

November 12, 1870.

(To be continued.)

## ON THE OCCURRENCE OF COPPER ORE IN THE ISLAND OF GRAND MANAN, BAY OF FUNDY.

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[In a recent description of the Island of Grand Manan, published in the *Canadian Naturalist*, by Professor Bailey, the author makes no mention of a very remarkable copper-deposit which occurs on the west coast of that Island. The following notice of this deposit is extracted from a report printed for private circulation in the autumn of last year.]

1. *General description of the Island* :—The Island of Grand Manan is situated near the mouth of the Bay of Fundy, about ten or twelve miles east of the coast of Maine. It extends in a general NNE and SSW direction, its average length being about twenty-one miles. In breadth, it varies from three or four miles in some places, to seven or eight miles in others. A small strip at the extreme south of the island belongs to the State of Maine; but with this exception the whole of the island is included within the Province of New Brunswick. Saint Andrews, the nearest port of the Dominion of Canada, lies about thirty miles to the north-west.

The eastern coast of the island is comparatively low, and much indented in outline, offering several wide bays and more or less sheltered coves with good anchorage. This side of the island contains one or two saw mills, and also a considerable number of detached settlements, chiefly occupied by fishermen. Towards the central part of the island the ground rises abruptly, and the entire western coast presents an almost unbroken line of high basaltic cliffs, rising vertically to a height of from 200 to 250 feet above the sea level. Below this escarpment, with its slides and talus of heaped and broken rock, there is no true beach, but merely a narrow belt of coarse shingle, covered in many places by huge columns and angular masses of basaltic trap which have fallen from the cliffs above.

The western side of the island, more especially, is densely wooded, and it would thus furnish a practically inexhaustible supply of good timber for mining purposes. Two or three small lakes also occur upon it, and streams emanating from these afford an unfailing supply of water. This point may be especially alluded to, as several valuable mining stations, situated on other islands of the Bay of Fundy, are

greatly impeded in their operations by the want of fresh water for washing and dressing the raised ore.

2. *Geological Features* :—The oldest rocks on the island are a series of metamorphic slates and conglomerates, probably of Palæozoic age. These are exposed chiefly on the north-east side of the island. They dip in various directions, but shew a general inclination towards the south-west. In the accompanying sketch-section these metamorphic strata are denoted by the letter A. They are traversed in places by trap-dykes, partly of an amygdaloidal character, and are covered here there by beds of drift gravel. At the base of the island, on the western side, strata of buff-coloured sandstone crop out, and range along the shore throughout almost the entire extent of this part of the coast. These sandstone beds (lettered B in the section) are apparently of Triassic age. They dip at a slight angle towards the south-west, and must thus overlie the metamorphic strata, somewhat as depicted in the section; but their extent in an easterly direction may be greater or less than is there shewn. Here and there, below the boulders on the shore, they are seen on the other hand to extend in broad layers beneath the sea. A bed of white or pale grey tufa (C), averaging about seven or eight feet in thickness, rests conformably on these sandstones, and is succeeded by a thin layer of soft clay-like tufa (D), the two presenting, in many places, no clearly discernible line of separation. Finally, above the whole of these beds, a mass of columnar and sub-columnar trap (E) forms a huge overflow, its surface sinking down in step-like ridges towards the east, whilst on the western shore, as already stated, it forms a range of high precipitous cliffs, rising almost vertically from the sea.

3. *The Mineral Bed* :—The outcrop of light coloured tufaceous rock (C) referred to above, although covered up in many places by heaps of detrital matter fallen from the cliff, can be traced along the face of the western escarpment throughout a length of eight or nine miles, and it extends undoubtedly beyond this distance. It is shown nowhere, however, in its true position; but only along the face of the slides or *éboulements* which rest against the face of the cliffs throughout the entire length of the island. As thus seen, it occupies a level much below the true position of the bed. The latter must be at least thirty or forty feet above high-water mark; whereas, on the face of the slides, the bed has been brought down in some places to within three or four feet of the water level, and in others to about fifteen or twenty feet. In

these slides, also, the bed has been more or less broken up, and has been made to dip inwards or towards the east, as shewn in the accompanying section, whilst the true inclination is evidently in the opposite direction.

This tufaceous bed carries small patches and stains of earthy malachite or green carbonate of copper apparently throughout its entire length; and where the bed has been excavated to the extent of a few feet, these stains and earthy masses are seen to have arisen from the partial decomposition of small strings and bunches of copper glance or sulphide of copper, one of the richest ores of that metal. Only two excavations, however, have at present been carried into the bed, and neither of these reaches the solid or unfractured rock. But these excavations are about five miles apart, and here and there, on the intervening stretch of shore, pieces of the rock, thickly charged with malachite, or shewing strings of copper glance, occur amongst the detrital matters dislodged from above. It may be fairly concluded, therefore, that the bed carries ore of this character throughout the entire length of its outcrop; but this cannot be absolutely proved without undertaking regular exploratory work, as a comparatively slight shock at the foot of the cliff is sufficient to bring down many tons of rock and stone. This tendency to fall is in great part due to the face of the cliff being composed of vertical columns of basalt, which separate readily at the partings. On the actual face of the outcrop, the show is in many places very poor. Here and there, for the space of a couple of fathoms or more, merely a few faint stains are observable, but in other places distinct patches of malachite occur. The ore appears to have been greatly decomposed near the face of the outcrop, partly, perhaps, by the action of sea-water; and it may thus, in course of time, have been gradually dissolved out or washed away. The water which infiltrates in places through the bed, holds evident traces of copper salts, as a film of metallic copper has been found on picks and hammers accidentally left in contact with it. The first three or four, or perhaps five feet of the bed (measured from the face of the outcrop generally,) will not certainly give an average yield of one per cent. of metal; but at a distance of ten or twelve feet, if the present excavations may be taken as a criterion, a yield of at least five or six per cent. may be anticipated (see Assays in § 4). Copper glance contains normally 79·8 per cent. of metallic copper: the presence of a comparatively small amount is sufficient, therefore, to form a paying ore. Malachite, also, although a



hydrated carbonate of copper, is comparatively rich in metal, as the copper in pure samples exceeds 57½ per cent.

4. *Results of Assays.*—A small sample shewing faint stains, from the face of the outcrop, yielded in metallic copper only 0.21 per cent. Another sample, also from the face of the outcrop, but containing small specks of earthy malachite, yielded 0.73 per cent. A sample taken from about twelve feet from the edge of the outcrop, and weighing nearly five pounds, gave 9.86 per cent. Two other samples gave respectively 4.63 and 6.15 per cent. Finally, a small sample from the same place, containing numerous strings of copper glance, yielded no less than 22.16 per cent. A piece of rock of about half a pound weight, picked up on the shore about a mile from the excavation which furnished the above samples, gave 4.58 per cent. metallic copper. Discarding the very rich and the very poor specimens, as exceptional examples, the results of these assays indicate an average yield of rather more than 6 per cent. But with the exception of the sample found upon the shore—and this may have been rolled there by the set of the tide, or dropped by some one passing the spot—these samples, it must be remembered, were obtained from a single spot of very limited extent, and hence they may not indicate in any way the true yield of the entire bed.

If the ore, allowing for loss, average 5 per cent. metal, each cubic fathom will contain about 2,020 lbs. of copper, and will weigh about eighteen English tons. Taking the mean thickness of the bed at only six feet, and assuming it to extend eastward, with the same yield of metal, to a distance of ten fathoms only, each mile in length will comprise 8,800 cubic fathoms of copper-holding rock, and will carry 7,890 tons of metal, worth, at the present low price of copper, about £580,000. In reference to this calculation, however, it must be observed that although the bed will probably be found to extend eastwards to a much greater distance than ten fathoms, its richness may not be constant throughout that distance; nor may the assumed yield be found to hold good, from fathom to fathom, along the entire length of the bed. On the other hand, the small strings of copper glance, as seen in the samples hitherto obtained, may thicken and form a network of ramifying veins, running in a general north and south direction—and in that case, the returns would be greatly in excess of the above estimate. It will thus be seen that in the present undeveloped state of the deposit, no definite conclusion can be arrived at respecting its true value.

5. *Proposed Exploratory Work.*—The extension of this copper-holding bed in a north and south direction may be regarded as fully proved; and it is equally certain that at particular spots the bed carries a profitable amount of ore. But the width of the bed, or its extent in an eastward direction, is altogether unknown; and it cannot consequently be predicted with certainty that the ore will be found in paying quantity throughout the bed generally. To determine these latter points, it will be necessary to carry a drift into the solid portion of the bed, the character of the ground precluding other modes of exploration. *This drift should be run, in my opinion, from a point in the south side of the ravine which opens into Little Dark Harbour.* The ravine in question cuts the strata of this western part of the island almost at right angles. If the drift, consequently, be started in this ravine at a sufficient distance from the shore, and at the proper elevation, it will prove the width or extension of the bed, to that distance at least, directly it strikes the solid rock; whereas, if started on the shore face of the escarpment, it will prove nothing until carried far into the bed; and the amount of tumbled rock and detrital matter, to be removed or passed through, will be about the same in either case. The distance of Little Dark Harbour from Sloop Cove, where the present excavation in the fallen rock matter has been opened, is about two and a-half miles. The cost of an exploration of this character would probably amount, on a rough estimate, to about two thousand five hundred or three thousand dollars—a certain outlay being required for preliminary expenses, in putting up shelter for the men employed, fixing forge and powder house, laying in provisions, &c.

6. *Working conditions of the Copper-holding bed, and general conclusions.*—The working conditions of this deposit are sufficiently favorable. The rock is comparatively soft, and is thus easily mined. The post and stall system would be employed in its removal. If the roof required additional support, plenty of suitable timber could be obtained on the island. The chief defect with regard to the ore, is the impossibility of concentrating it by dressing, without at least a very considerable loss. It might be cobbled or hand-dressed to a slight extent, but would otherwise have to be treated in bulk. The gangue is a silicate, free or nearly so from carbonate of lime. All things considered, a wet process for the extraction of the copper would give the most satisfactory results. If the ore be found to retain its present character, indeed, no other system could be profitably employed. It is

also evident that the ore could not be exported, to be reduced elsewhere, but the extraction of the copper must be carried on at the mine itself. The necessary works could only be erected on the summit of the cliff, as the exposed shore presents no site for this purpose, and the intersecting ravine at Little Dark Harbour is apparently too contracted for the erection of suitable buildings; but no difficulty need be apprehended on this account. By the formation of slides on the cliff-face, the ore could be run up by various known methods, abundant water-power being available on the higher ground for that purpose. Until further exploration be effected, however, the erection of reducing works, or expenditure of capital in fitting the ground for permanent mining occupation, cannot be legitimately recommended.

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## ANOMALOUS PRODUCTION OF OZONE.

BY HENRY H. CROFT,

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About six years ago, when evaporating some syrupy Iodic Acid, prepared according to Millon's process, over sulphuric acid I noticed that when the acid began to crystallise, the air in the jar (covering the drying dish) had a strong smell of ozone, or active oxygen. A couple of years afterwards, on again making iodic acid, this observation recurred to my mind, and I carefully tested the air in the jar during the evaporation; no trace of ozone could be detected until the acid began to crystallise, when the smell of ozone became immediately perceptible, and all the usual tests for that body succeeded perfectly.

During the last month I have had occasion to convert two ounces of iodine into iodic acid, and exactly the same result has been observed.

The acid usually solidifies to opaque verrucose masses; but on this occasion, the crystals formed were clear and brilliant. The solution had in this, as in all the former cases, been boiled down to thin syrup, so that no trace of chloriae, or nitric acid, could possibly have remained to act on the ozone paper. The air in the jar was tested from day to day, both by the smell, and the action of iodised starch paper. Even when a few crystals began to form no change was noticed; but when the crystallisation set in fully the evolution of ozone was most remark-

able, the strong smell being quite characteristic, entirely different from that of chlorine or nitric acid.

I am quite unable to account for this ozonification of the air (or oxygen) over crystallising iodic acid. My friend, Mr. Sterry Hunt, has suggested that it may arise from a partial deoxidation similar to that which produces ozone when hypermanganates are decomposed, as observed by him and other chemists. As the crystallizing acid remains perfectly white, either opaque or transparent, and as the lower oxides of iodine are of a yellow, or even brown colour, according to Millon, I cannot accept this explanation, and even if it were true, the phenomenon would be equally unintelligible—a reduction taking place during crystallisation. I can offer no explanation of the *simple fact* that air over crystallising pure iodic acid, becomes ozonised, but I think that the observation seems to offer a wide field for further experiments, which I have unfortunately not the time to carry out.

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## LAHONTAN.

BY THE EDITOR.

The ordinary biographical notices of the Baron LAHONTAN are very meagre. In the books of reference nearest at hand, his name does not appear at all. It is absent in Morgan's Sketches of Distinguished Canadians, or Persons connected with Canada, in Appleton's Cyclopædia of Biography (New York), and in Thomas's Universal Pronouncing Dictionary of Biography (Philadelphia). As his name comes up in connexion with the very early history of Toronto, I have thought it expedient to draw up a brief memoir, to be appended to a series of papers on that subject. My sources of information will chiefly be incidental autobiographical notices scattered up and down his own pages. Such a memoir may also possess a general interest, as all those who concern themselves with the literature of early Canadian and North American history generally, must look into the *Nouveaux Voyages dans l'Amérique Septentrionale*, and so will naturally desire such detail of the author's history as may be had.

The complete title-page of the copy now before me is, when translated into English, as follows: "New Travels, by Mons. le Baron de Lahontan, in North America; containing an account of the different

Tribes inhabiting that region, the character of their Governments, their Commerce, their Customs, their Religion and their mode of Warfare. Also the interest which the French and English have in commercial dealings with those Tribes; the advantage which England has it in her power to gain in that country, when at war with France. The whole enriched with Maps and Engravings. The Hague. L'Honoré, Brothers, Merchant Booksellers. 1703." The work is in two volumes, small 12mo. On the title page is L'Honoré's device, a winged Fame, seated amidst symbols of learning and science, presenting a wreath: the whole surrounded by the legend, which is a play on the publisher's name, *Honoratus que virtutem Honorat*. A mysterious double frontispiece precedes: one side gives a globe floating in space, with a swallow flying; and the legend *Orbis Patria*: the other shows an Indian, bearing an arrow and bow, and setting his right foot on a crown and sceptre, and his left on a clasped volume: above is the legend, *Et leges et sceptrā terit*. All this is to give a hint (1) of the cosmopolitanism; (2) of the admiration of the free and independent "savage" character, affected by the author.

The work itself is perhaps of no very great intrinsic value. Most of its solid information could be gleaned, if necessary, from other existing sources, contemporary or anterior in time. I think the book was brought out somewhat as we see books brought out occasionally now. It was a narrative which the publisher and author thought would sell, in consequence of the situation of European affairs at the moment.

War had recently been declared between France and England. Not only on the continent of Europe were the troops of William III. and Louis XIV. in active conflict, but collisions were taking place between the conventional adherents of the two potentates in the remote world of North America; and here was a writer coming forward fresh from the scene of action; one who had actually taken part in the hostile operations on the western side of the Atlantic.

The maps and engravings with which the volumes were "enriched" look, at the present day, sufficiently rude and quaint. In the English edition the author complains of the mistakes of the Dutch engravers, in the illustrations of the edition published at the Hague. He says: "I have corrected almost all the cuts of the Holland impression, for the Dutch gravers had murdered them, by not understanding their explications, which were all in French. They have graved women for

men, and men for women; naked persons for those that are clothed, and *à contra*. As for the maps," he adds, "the reader will find them very exact; and I have taken care to have the tracks of my voyages more nicely delineated than in the original."

About the same period too, the public mind had been roused by accounts of recent additional discoveries on the great continent of North America. In Thévenot's Collection of Travels, published at Paris in 1681, there was an account of the discoveries of Marquette. In 1683, Louis Hennepin had published, also at Paris, his "Description de la Louisiane au sud-ouest de la Nouvelle France, avec la carte du pays, les mœurs et la manière de vivre des Sauvages. Paris, Seb. Hure. 1683;" and in 1697 the same writer had put forth at Utrecht his "Nouvelle Découverte d'un très-grand Pays situé dans l'Amérique, entre le Nouveau Mexique et la Mer Glaciale;" and in the following year, at the same place, appeared his "Nouveau Voyage d'un pays plus grande que l'Europe entre les Mers du Sud et du Nord, avec les Mœurs et Manières de vivre des Sauvages." In 1697 also, Tonti's "Narrative of La Salle's Descent of the Mississippi to its Mouth," appeared at Paris. These works were doubtless meeting with a sale that was deemed large in those days, and were making no small stir. More matter of the kind indicated by the foregoing titles, would be calculated to meet with acceptance. Lahontan accordingly, in addition to an account of events in Canada from 1683 to 1694, admits into his work a highly-dressed-up narrative of an excursion of his own up one of the northern branches or affluents of the Mississippi; a narrative which he makes the vehicle of a variety of reports of people and places, of new lakes and seas to the south and west, collected from Indians casually met with by himself in his expedition. It is the letter or chapter which contains this particular narrative, that has brought a degree of discredit upon Lahontan, and caused other parts of his book, to which no particular improbability attaches, to be questioned.

It would seem as if his informants up the Long River, as the branch of the Mississippi which he is said to have explored was called, meeting with a person apparently easy of belief, had in some instances fooled him probably as they thought, to the top of his bent; and only too faithfully did Lahontan transfuse into his pages the spirit of the fabulists whom he encountered.

By evil communications with the Iagoos of the Red men, he came to be classed among Iagoos himself, more completely than he perhaps in reality deserves.

"Very boastful was Ingoo:  
 Never heard he an adventure,  
 But himself had met a greater;  
 Never any deed of daring,  
 But himself had done a bolder;  
 Never any marvellous story,  
 But himself could tell a stranger."

Everything, however, should not be set down as intentional extravagant representation on either side. There must necessarily have been many misunderstandings on the part of both traveller and informants, arising out of mistakes in language and idiom, and from interpreters not familiarly comprehending the dialects which they professed to translate. On one occasion, after questioning some natives far up the river which he had penetrated, we have Lahontan's own remark: "This was all I could gather. My curiosity prompted me to desire a more particular account; but unhappily I wanted a good interpreter; and having to do with several persons who did not well understand themselves, I could make nothing of their incoherent galimatias." He then adds: "I presented the poor, miserable slaves with something in proportion to the custom of the country; and endeavoured to persuade them to go with me to Canada, by making them such offers as in their esteem would appear like mountains of gold; but the love they had for their country stifled all persuasions; so true it is, that nature, reduced to its just limits, cares but little for riches." The "poor, miserable slaves" were four captives in the hands of the tribe visited farthest up the river. These captives were said to belong to a people called the Mozeemleks. They had a thick, bushy beard, and their hair hung down under their ears: he should have taken them, from their general appearance, he says, to be Spaniards. Here is a specimen of the information these captives gave him, whatever it was worth: "The Mozeemlek nation is numerous and powerful. Its principal river, they said, rose on the other side of the mountains, which were six leagues across; and after a course of 150 leagues, it emptied itself into a salt lake 300 leagues in circumference, by a mouth two leagues broad. The lower part of that river, they said, is adorned with six noble cities, surrounded with stone, cemented with fat earth. The houses of these cities have no roofs, but are open above, like a platform. Besides these cities, there are above a hundred towns, great and small, round that quasi sea, on which they sail in large boats. The people of that country made stuffs, copper axes, and several other manufactures,

of which my interpreters could give me no idea," he remarks, "as being themselves altogether unacquainted with such things. The government was despotic, they said, and lodged in the hands of one great chief, to whom the rest paid a trembling submission. The people upon the lake referred to called themselves Tahuglauk, and were as numerous as the leaves of trees. The Mozeemlek people supply the cities and towns of the Tahuglauk with a great number of small animals, of the size of a calf, which they catch on the mountains. The Tahuglauk make use of these small animals for several purposes: they not only eat their flesh, but bring them up to labour, and make clothes, boots, and so on, of their skins." The people among whom Lahontan met with these four captives are called by him Gnacsitaires. The captives said they had been taken prisoners by the Gnacsitaires in a war, which had now lasted eighteen years, between that people and the Mozeemlek; but that they hoped a peace would be speedily concluded, upon which the prisoners would be exchanged, pursuant to custom. They boasted that the Mozeemlek possessed a greater measure of reason than the Gnacsitaires could pretend to; that the Mozeemlek confessed in the Gnacsitaires only human form; otherwise they regarded them as brute beasts. "To say my mind," Lahontan observes, "their notion upon this head is not so very extravagant; for I observed so much honour and politeness in the conversation of these four captives, that I thought I had to do with Europeans. But after all, I must confess," he says, "the Gnacsitaires are the most tractable I met with among all the savages." After describing some pieces of wrought copper which they had in their possession, he proceeds to say: "I could pump nothing further out of them in relation to the country, commerce and customs of that remote nation. All they could say was, that the Great River of that nation runs all along westward, and that the Salt Lake into which it falls is three hundred leagues in circumference and thirty in width, its mouth stretching a great way to the southward. I would fain have satisfied my curiosity in being an eye-witness of the manners and customs of the Tahuglauk; but that being impracticable, I was forced to be instructed at second-hand by these Mozeemlek captives, who assured me, upon the faith of a savage, that the Tahuglauk wear their beards two finger-breadths long; that their garments reached down to their knees; that they cover their heads with a sharp-pointed cap; that they always carry a long stick or cane in their hands; that they wear a sort of boots, that reached up to the knee; that their wives are



never seen in public," &c. &c. It may be observed that Marquette, on whose narrative no doubt rests, heard, when at the mouth of the Missouri, several years previously, of a portage up that river, across a prairie of only five or six days' journey, by which a river running west into the sea could readily be reached. This sea he believed to be the Pacific Ocean; and "If God gives me health," Marquette added, "I do not despair of one day making the discovery."

It was, as we have said, the contents of his 16th chapter or letter, that brought the rest of Lahontan's book into disrepute. The information gathered from his aboriginal authorities was evidently not to be relied on. The details of his own journey to the country of the so-called Gnacsitares, its stages and distances, were also glaringly incredible. No sane person who reflected for a moment could believe that it was possible in the months of December, January, February and March—these were the months taken up with his too-famous excursion—to conduct a flotilla of boats with a considerable body of soldiers, and a number of native guides and attendants, with a store of provisions and arms, and apparently an unlimited supply of presents, up and down an extensive North American river in the latitudes in which the newly-explored river was supposed to be situated—especially to do it with the magical facility with which Lahontan represents himself to have accomplished the feat. I do not think that he ever expected his story, as contained in this chapter, to be taken as literal truth by any one who should trouble himself to think seriously on the subject. The utter extravagance of the map, too, which he gives in illustration of his jaunt, was an admonition, as I take it, that the whole thing was a piece of rhodomontade. He records, in fact, upon the face of the chart, that the most important portion of it was drawn for him on a piece of buck-skin by his friends the Gnacsitares, "who gave me to know," he adds in the same memorandum, "the latitudes of all the places marked in

by pointing to the respective places of the heavens that one or other corresponded to; for by this means I could adjust the latitude to half a degree or little more; having first received from them a computation of the distances in Tazous, each of which I compute to be three long French leagues." The part of the Rivière Longue (or Rivière Morté, as he says some persons call it), explored by him, he sketched out on his map in continuation of the stream as drawn by his friends the Gnacsitares, making it appear a river fully as large and important as the Mississippi itself.—One might almost imagine that he desired to

bring ridicule upon the reported discoveries of other travellers in the west, and in particular on Marquette's map of the Lower Mississippi, which probably he had seen and through prejudice perhaps discredited—a map which, though drawn in good faith, represents the relative magnitudes of the principal river and a number of its affluents very incorrectly, as was to be expected in a first rude unscientific delineation, made simply by the aid of the eye.

As to the river which Lahontan visited, and, to some extent, explored, it is supposed to be that known at the present time as St. Peter's, or Minnesota River, which enters the Mississippi at Fort Snelling. St. Peter's or Minnesota River anywhere else would be considered a stream of considerable magnitude. Its entire length is estimated at four hundred and fifty miles. It is navigable at high water, for steamboats, sixty miles from Fort Snelling. It is suggested in Perkins' *Annals of the West*, p. 20, published at Cincinnati in 1846, that "the baron entered St. Peter's when filled with the back waters of the Mississippi, and that he heard from the Indians of the connection by it and the Red River with Lake Winnipeg, and the communication between that lake and Hudson's Bay by Nelson River, and looking westward all the while, turned Hudson's Bay into the South Sea." In sailing, and other modes of locomotion, a person's head is sometimes turned about, as the expression is. Perkins' hypothesis would require us to imagine that some such confusion in regard to the points of the compass had arisen in the mind either of Lahontan or of his informants. It is more reasonable to imagine that Lahontan on this occasion, and at other times in the course of his wanderings, fell in with Indians acquainted in some degree, either by experience or by hearsay and oral tradition, with the well-beaten trails leading across from the head-waters of the Missouri to the head-waters of the Colorado. In this case the Salt Lake spoken of will have meant the Gulf of California, with stories and traditions mixed up, of the stone-built cities of Mexico and Central America, which, as we know, were by no means myths. In Nicollet's Report to Congress in 1843, it is supposed that Cannon River is the one entered by Lahontan; and Nicollet accordingly names that stream "the River Lahontan." The whole length of Cannon River, however, is only 80 miles.

The account which Lahontan gives of the origin of his book is this: On leaving France for Canada, on military duty, he promised an aged relative of his, to whom he was indebted for an annual allow-

ance of money, a letter from time to time, containing a narrative of occurrences in Canada, with descriptions of the natives and natural productions of the country.

These letters were not in the first instance intended for publication, but having occasion to apply to the government of France for protection against what he deemed to be an unjust proceeding on the part of one of the courts of the country, and thinking that his professional services in Canada were not sufficiently recognized, he decided at length to communicate to the public what was at first intended only for the eye of an interested patron and relative. The letters, of which he had retained copies, he accordingly allowed to be printed, just as they were, affected all of them, more or less, by a desire to amuse and please his aged benefactor, and to make, in his eyes, a respectable shew of enterprise and military tact, of spirit and efficiency.

It is well known that a few years previous to the publication of the "Nouveaux Voyages dans l'Amérique Septentrionale," the heroic La Salle had obtained important distinctions and advantages from Louis XIV. through personal representations at Court of his enterprises and discoveries. Lahontan, baffled by the opposition that had been excited against him in the mind of the French minister, desired to imply by his book that he was as much entitled as La Salle to the favours of the Government—And, in truth, it is not improbable that Lahontan would have succeeded with the authorities at Paris, almost as well as La Salle, had he been a man somewhat different, endowed, at all events, with a little more prudence. We find that a good deal of consideration was really shewn him in view of certain family losses, and that an appointment of some dignity was given him in Newfoundland—an appointment, however, speedily rendered untenable by disagreements between himself and his superior officer.

In Canada, likewise, Lahontan's independence of character brought trouble upon him. He ventured to find fault with the proceedings of the Jesuit association—a body apt with some adroitness to represent opposition to itself as hostility to religion. It is chiefly to the official "Relations" of the Jesuits, and other productions of theirs, that he refers when he says, in the Preface to his Travels: "A good many works on the same subject (*viz.*, North America) have already been given to the public but they all labour under the essential defect of a want of disinterestedness and sincerity. They are all of them the productions of missionaries,—that is, of a class of men, bound by their

very profession to persuade the world that their labours, praiseworthy as they otherwise are, are not wholly without fruit. Hence it happens that, speaking strictly, their narratives are nothing more at bottom than a detail of masses said, of miracles, of conversions, and other particulars directly fraudulent, which the good sense of the present age does not readily accept. In a word, the authors in question, urged forward by a zeal, true or pretended, have written more for a cause than for the purpose of making the reader acquainted with what really happens in a country."

And again, in the Preface to the English edition, he says, "Notwithstanding the veneration I have for the clergy, I impute to them all the mischief the Iroquois have done to the French colonies in the course of a war that had never been undertaken, if it had not been for the counsels of these pious Churchmen." He adds that his strictures would have been severer had he not restrained his pen out of regard to the prejudices of his aged relative. "He hears now," he says, "that some pedants are set to work to lash me in writing; and so I must be prepared to stand a shower of insults that will be poured upon me in a few days. But it is no matter," he continues, "I am so good a conjurer that I can ward off any storm from the side of Paris. I laugh at their threats, and since I cannot make use of my sword, I will wage war with my pen."

Having shown himself indisposed to an unreasoning deference in quarters where, in his day, such a homage was exacted and rendered, it is not to be wondered at that Lahontan failed to conciliate the goodwill of every one, either in Canada, Newfoundland or France, and that his name should occasionally be referred to in a tone that sounds slightly vindictive.

The brief article in Watkins' Biographical Dictionary of the year 1807 is derived from a French work entitled "*Nouvelle Dictionnaire Historique*," and it reads as follows: "A native of Gascony, in the seventeenth century, who published his *Travels in North America*, written in a barbarous style. He was an officer in the French service, from which he was dismissed for bad conduct, and at length settled in Denmark." Again, in his "*Genius of Christianity*," Chateaubriand has a scornful reference to Lahontan: "When the Jesuits published the valuable correspondence known as the '*Lettres Edifiantes*,' the work was universally quoted and studied. Reliance was placed on its authority and the facts related therein were held to be indubitable."

But it soon became the fashion," he complains, "to decry what had been admired. Being written by Christian presbyters, could these letters, it was asked, be of any real value? Writers were not ashamed," he finally adds, "to prefer, or to affect to prefer, to the travels of such men as Dutetre and Charlevoix, those of a Baron de Lahontan, an ignorant man and a liar."

It is at Lahontan that Charlevoix himself probably glances when he says (Journal, 66): "There are some travellers who make no scruple to fill their journals with whatever they hear said, without troubling themselves about the truth of anything. You would not, doubtless, have me follow their example, and impose upon you for truth all the extravagant things that have been placed to the account of our savages, or that have been taken as they could from their traditions. These traditions, on the other hand, are so little to be relied on, and almost always contradict each other so grossly, that it is almost impossible to discover anything from them that may be depended on." And in the same writer's account of the interior of the church of the Jesuits at Quebec: "I do not mention," Charlevoix says, "*the four great cylindric massive columns, made of one block, of a certain Canadian porphyry, black as jet, without spot or vein, with which it pleased the Baron de Lahontan to enrich the grand altar. They would certainly be much better,*" he continues, "*than those they have, which are hollow and coarse imitations of marble [grossierement marbrées]. But this author might easily obtain pardon, if he had disguised the truth only to adorn the churches."* And again: Charlevoix names Lahontan in connection with the fur-trade of Montreal, at the same time giving a sense to Lahontan's words which they do not possess. "If you meet, madam, by chance, with the book of Lahontan," says Charlevoix to la duchesse de Lesdignieres, to whom his Journal is addressed, "where mention is made of this fair [the periodical trade-sale of furs at Montreal], I would have you take care how you give credit to what he says of it: he does not even preserve probability. The women of Montreal never gave any foundation for what this author reports of them," &c. What Lahontan had said was: "*Vous seriez surpris de voir les débauches, les festins, les jeux et les dépenses que ces coureurs de bois font tant en habits qu'en femmes, dès qu'ils sont arrivés.*" He then explained that he referred especially to the unmarried *coureurs de bois*: these, he said, on returning to Montreal, after their lengthened absences in the forest, behaved "*comme les matelots*

qui viennent des Indes ou de faire des prises en course ;” the application of which language was plainly not so wide as Charlovoix insinuates to the French duchesse.

Finally, the Jesuit partisans pronounced Lahontan nothing better than a “savage,” to which reproach he ingeniously replied, in the English edition of his work : “These observators do me a great deal of honour, so long as they do not explain themselves so as to make me directly of the same character with that which is tacked to the word “savage” by the Europeans in their way of thinking ; for in saying only that I am of the same temper with the savages, they give me, without design, the character of the honestest man in the world.” The anticipated charge of barbarism in style he had already endeavoured to soften in the Preface to the first edition of his travels, in the following way : “The style of our author,” he says, “will appear perhaps not the most pure and polished ; but this very thing ought to render him less exposed to the suspicion of affectation ; and besides, what else could be expected from a youthful officer of marines ? One thing, however, is certain, which no discerning reader will fail to see : the writer applies himself solely to the simple exposition of facts ; he flatters nobody ; he disguises nothing ; and there may be justly attributed to him what is essential in all good narrators, the characteristic of writing (without prejudice to his duty to his God and his king be it said) as though he himself had neither country nor creed.” “His travels are written in a barbarous style,” also asserts the *Nouvelle Dictionnaire Historique*, quoted above. That is, as we suppose, his sentences appear to the French critic to want airiness and epigrammatic point. The English reader, however, will not consider Lahontan’s style so very much amiss ; he will regard it, probably, as simply natural and straightforward.

(*To be continued.*)

[Passages in Lahontan’s Travels, of interest to the historian of Toronto, are the following, : In his twenty-third letter—

“Since we cannot destroy the Iroquois with our single forces, we are necessarily obliged to have recourse to the savages that are our allies ; and it is certain, as they themselves foresee, that if these barbarians could compass the destruction of our colonies, they would themselves be subdued by them sooner or later, as it has happened to many other nations : so they know it to be their interest to join with us to destroy these banditti. Now, since they are well affected to this design, we

must endeavour to facilitate to them the means of putting it in execution; for you may easily believe that these people, savage as they are, are not so void of sense as to travel two or three hundred leagues from their own country, to fight against their enemies, without being sure of a place of retreat, where they may repose themselves and find provisions. There is no question, therefore, but we should build forts upon the lands of the Iroquois, and maintain them in spite of their teeth. This, sir, is what I proposed above a year ago to M. de Frontenac, and it is what he would have me still to undertake. I project, therefore, to build and maintain three forts upon the course of the lakes, with some vessels that shall go with oars, which I will build according to my fancy; but they being light and of great burden, may be managed either with oars or a sail, and will also be able to bear the shocks of the waves. I demand fifty seamen of Biscay, for they are known to be the most dexterous and able mariners that are in the world. I must also have two hundred soldiers, chosen out of the troops of Canada. I will build these small fortresses in several places; one at the mouth of the Lake Erie, which you see in my map of Canada, under the name of Fort Supposé, besides two others. The second I will build in the same place where it was when I maintained it in 1687 and 1688, whereof I have written to you in my fourteenth and fifteenth letters; and the third at the north of the Bay of Toronto, upon the same lake. Ninety men will be sufficient to garrison these three redoubts, and perhaps a smaller number; for the Iroquois, who never saw a cannon but in a picture, and to whom an ounce of powder is more precious than a louis'd'or, can never be persuaded to attack any kind of fortification."

Again, in a brief general description of Canada, which he sends his relative, after giving some account of Hudson's Bay and the country round Lake Superior, he proceeds: "From the Superior or Upper Lake, I steer to that of the Hurons, to which I allot four hundred leagues of circumference. Now, to make this lake, you must sail down by the Fall called Sault Ste. Marie, which I described in my fifteenth letter. This lake is situated in a fine climate, as you will perceive from the map. The north side of it is best for the navigation of canoes, by reason of the frequency of the islands, which afford shelter in bad weather. The north side is pleasanter, and more convenient for the hunting of deer, which are there very plentiful. The figure of this lake comes near to an equilateral triangle. Of all its islands, that called Manitoualin is the most considerable, being above twenty leagues long

and ten broad. In former times, Ottawas, of the nations Talon and Sable, dwelt in it; but the dread they were under, on account of the Iroquois, obliged both them and their neighbours to retire to Michilimackinac. That part of the continent that faces this island is inhabited by the Nockes and Mississagues, in two different villages, which are twenty leagues distant the one from the other. Towards the east end of this island we fall in with French River, which I took notice of in my sixteenth letter. It is as broad as the Seine at Paris, and runs not above forty leagues in length from its source in the Lake Nipissing to its mouth. To the north-east of this river there lies the Bay of Toronto, which is twenty or five-and-twenty leagues long, and fifteen broad at its mouth. This bay receives a river that springs from a little lake of the same name, and forms several cataracts that are equally impracticable both upon the ascent and descent. Upon the side of this river you will see a man's head marked in my map, which signifies a large village of the Hurons, that was destroyed by the Iroquois. You may go from the source of this river to the lake Frontenac, by making a land carriage to the river of Tanaouaté [the Humber], that falls into that lake. Upon the south side of the Bay of Toronto you will see the fort called the Fort Supposé, which I mentioned in my twenty-third letter; and about thirty leagues to the southward of that, you find the country of the Theonontate, which, being formerly inhabited by the Hurons, was entirely depopulated by the Iroquois."

And again, after describing Lake Erie, and coming to Lake Frontenac, he repeats his information in regard to the route from that lake to Lake Huron: "On the north side," he says, "we meet with several little gulfs. You may go from this lake to that of the Hurons by going up the river Tanaouaté [the Humber], from whence you have a land carriage of six or eight leagues to the river of Toronto [the Severn]."

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## THE LATE PROFESSOR HINCKS.

At the opening meeting of the session of the Canadian Institute for 1871-2. the President referred to the recent death of Professor Hincks in the following terms :

Before proceeding to the business of the evening it will be becoming in me to give some expression to that feeling of deep loss which I am sure the members of the Canadian Institute experience in being deprived by death of the presence amongst them of the late Professor Hincks. He was, as you know, for two years our President, for several years the editor of our *Journal*, and from the moment of his arrival in Canada to the day almost of his decease an active member of our body, furthering its objects, promoting its well-being, and sustaining its reputation, as well by his written and oral communications, as by his exertions otherwise, and ready help on every possible occasion. I need but allude to the heartfelt regret which we feel at the thought that we are to see his face no more; that we are no more to hear amongst us his earnest animating voice. The time is so very recent when we beheld him visibly before us, no laboured description is required to recall to our minds his form, his air, his manner of speech. Himself sincerely enjoying to the minutest tittle the wide and varied subject-matter of his own special departments of study and research, it was to him manifestly a never-failing pleasure to share with others every particle of the light and information which yielded to himself so much hearty satisfaction; and I doubt not there are many here who will ever associate numerous welcome additions to their own mental stores with words uttered by Professor Hincks,— words always so telling and interesting, on the one hand by reason of their real value, and on the other in virtue of that slight tincture of archaism in their combination and delivery, which was suggestive of a literary and scientific school now beginning in the mother country to be regarded as historical.

Most of the papers by the late Professor that enrich the pages of the *Canadian Journal* were read, as you know, before the Institute. Several of them will furnish material for the use of scientific men engaged especially in Canadian investigations; as, for example, his paper in Vol. vi., p. 165, entitled a "Specimen of the Flora of Canada," and another in Vol. vii., p. 446, "Materials for a Fauna Canadensis." Other papers contributed by him on subjects connected with his especial department of science are "Natural History in its relation to Agriculture," "Considerations respecting anomalous vegetable structures," "The Family of Falconidæ," "On some questions in relation to the theory of the structure of plants of the orders Brassicacæ and Primulacæ," "Remarks on the classification of Mammalia," "An attempt at an improved classification of Fruits," "The Struthionidæ," "On Molluscous Animals," "The Grallatores," "An Improved Arrangement of Ferns." &c. Within his especial department his range was, as we see, wide. He did not, however, confine himself to such limits. In the *Journal* we have contributions of his on metaphysical and social-science questions; as, for example, "The Sensational Philosophy," "A new Theory of Human Emotions," "Thoughts on Belief and Evidence," "The true aims, foundations and claims of Political Economy," "On the Interchange of Commodities

between Individuals and Nations," "Economical Questions bearing on Canada," &c. Linguistics, too, had been cultivated by him through an hereditary predilection; but no papers of his on that subject appear in our *Journal*.

Our regrets for the loss of Professor Hincks are shared by the University of Toronto, and by numerous members of the community at large. Many of the youth of Western Canada gratefully acknowledge their intellectual indebtedness to him. They have derived from him a precious discipline of the powers of observation, with apt methods of analysis and classification. Through him there has been enkindled within some of them an ardour in the pursuit of particular studies in Natural Philosophy which will be quenched only, as in their instructor, with life; with such effect, in their case, did he speak of "trees, from the cedar that is on Lebanon; even unto the hyssop that springeth out of the wall; of beasts, and of fowl, and of creeping things, and of fishes;" nor did he fail to turn the thoughts of his auditors, at all fitting moments, to the infinite perfection of the Divine handiwork in every organism and object.

Not to speak of the amount of quiet personal happiness secured to individuals through the zest added to everyday life by the possession of an eye taught how to see, and a mind taught how, in some degree, to interpret the things seen, results of vast moral and material advantage to the whole of Canadian Society must in due time accrue from so large a portion of the community having been, by such men as the late Professor, trained to look intelligently on nature, and so qualified to put to their designed uses the several parts of the wonderful world which is appointed to be the scene of man's labours.

Having, in common with you all, entertained a very sincere regard for the late Professor Hincks, I could not let slip the opportunity of offering this tribute to his memory, which will long continue green amongst us.

[The late Professor Hincks was the son of the Rev. Dr. Hincks, of Belfast, Professor of Hebrew in the Royal Institution of that city, and brother of the distinguished Oriental Scholar and Archæologist, Dr. Edward Hincks, formerly Fellow of Trinity College, Dublin. On the establishment of a chair of Natural History in Queen's College, Cork, the late Professor received the appointment; and from 1854 he held a similar position in University College, Toronto. He died on Sunday, Sept. 10th, 1871, aged 79. He contributed papers on Botany to the British Association, of which he was an early member, and to the Linnæan Society, of which he was for many years a Fellow. His contributions to the *Canadian Journal of Science, Literature and History* are enumerated above.]

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## CANADIAN INSTITUTE.

## ANNUAL REPORT OF THE COUNCIL FOR THE YEAR 1870-'71.

The Council of the Canadian Institute have the honor to present the following report of the proceedings of the Society for the past year from the 1st December, 1870 to 30th November, 1871..

## MEMBERSHIP.

The present state of Membership:

Members at commencement of Session, 1st December, 1870 ..	343
Members elected during session 1870-71 .....	12
	— 355

*Deduct.*

Deaths .....	6
Withdrawn .....	6
Left the Province .....	3
Non-payment of Subscriptions .....	6
	— 21
	334

*Composed of*

Honorary Members .....	5
Life Members .....	26
Corresponding Members .....	5
Ordinary Members .....	298
	— 334

## COMMUNICATIONS.

The following list of papers read at the ordinary meetings held during the Session will be found to contain many valuable communications:

- 2nd December, 1870.—Rev. Prof. Hincks, a Communication on the "Gigantic Trees of California," and T. C. Patteson, Esq., on "The Yosemite Valley."
- 9th December, 1870.—Dr. Temple, a "Case [of Ramela]" that occurred in his practice.
- 16th December, 1870.—The Annual Report.
- 18th January, 1871.—Rev. Dr. Scadding, Annual Address—"Museums and other Classified Collections, temporary or permanent, as Instruments of Education in Natural Science."
- 20th January, 1871.—Dr. W. Caniff, "A Case of Malignant Disease of the Mouth, occurring in a patient operated upon a year ago by him in the Toronto General Hospital."
- 27th January, 1871.—J. Loudon, M.A., "On Trilinear Co-Ordinates."—Dr. D. Wilson, "On the Education of the Hand."
- 3rd February, 1871.—Dr. C. B. Hall, "Biographical Sketches of Eminent Medical Men."
- 17th February, 1871.—Dr. Reeve, "A Case of a Foreign Body in the Orbit."
- 18th February, 1871.—J. Loudon, M.A., "On the Equilibrium of Floating Bodies." Prof. Goldwin Smith, "On Some Points connected with War and Military Affairs in the Time of Edward III."

(To be Continued.)

## CANADIAN LOCAL HISTORY.

## TORONTO OF OLD:

A SERIES OF COLLECTIONS AND RECOLLECTIONS.

BY THE REV. DR. SCADDING.

## XLIV.—YONGE STREET—FROM THE BAY TO QUEEN STREET.

The tourist of the present day, who, on one of our great lake-steamers, enters the harbour of Toronto, observes, as he is borne swiftly along, an interesting succession of street vistas, opening at intervals inland, each one of them somewhat resembling a scene on the stage. He obtains a glimpse for a moment of a thoroughfare gently ascending in a right line northward, with appropriate groups of men and vehicles, reduced prettily to lilliputian size by distance.

Of all the openings thus transiently disclosed, the one towards which the boat at length shapes its course, with the clear intention of thereabout disburdening itself of its multifarious load, is quickly seen to be of preëminent importance. Thronged at the point where it descends to the water's edge with steamers and other craft, great and small, lined on the right and left up to the far vanishing-point with handsome buildings, its pavements and central roadway everywhere astir with life, its appearance is agreeably exciting and even impressive. It looks to be, what in fact it is, the outlet of a great highway leading into the interior of a busy populous country. The railway station seen on the right, heaving up its huge semicircular metal back above the subjacent buildings, and flanking the very sidewalk with its fine front and lofty ever-open portals, might be imagined a porter's lodge proportioned to the dignity of the avenue whose entrance it seems planted there to guard.

We propose to pass, as rapidly as we may, up the remarkable street at the foot of which our tourist steps ashore. It will not be a part of our plan to enlarge on its condition as we see it at the present time, except here and there as in contrast with some circumstance of the past. We intend simply to take note, as we ramble on, of such recollections as may spring up at particular points, suggested by objects or localities encountered, and to recall at least the names, if not in every instance, characteristic traits and words and acts of some of the worthies of a bygone generation, to whose toil and endurance the present occupants of the region which we shall traverse are so profoundly indebted.

Where Yonge Street opened on the harbour, the observer some forty years ago would only have seen, on the east side, the garden, orchard and pleasure grounds of Chief Justice Scott, with his residence situated therein, afterwards the abode of Mr. Justice Sherwood; and on the west side the garden, orchard, pleasure-grounds and house of Mr. Justice Macaulay, afterwards Chief Justice Sir James Macaulay, and the approaches to these premises were, in both cases, not from Yonge Street but from Front Street, or from Market Street in the rear.

The principal landing place for the town was for a series of years, as we have elsewhere stated, at the southern extremity of Church Street; and then previously, for another series of years, further to the east, at the southern extremity of Frederick Street. The country and local traffic found its way to these points, not by Yonge Street south of King Street, but by other routes which have been already specified and described.

Teams and solitary horses, led or ridden, seen passing into Yonge Street, south of King Street, either out of King Street or out of Front Street, would most likely be on their way to the forge of old Mr. Philip Klager, a German whose name we used to think had in it a kind of anvil ring. His smithy, on the east side, just south of Market Street, now Wellington Street, was almost the only attraction and occasion of resort to Yonge Street south of King Street.

His successor here was Mr. Calvin Davis, whose name became as familiar a sound to the ears of the early townfolk of York as Mr. Klinger's had been.

It seems in the retrospect but a very short time since Yonge Street south of King Street, now so solidly and even splendidly built up, was an obscure allowance for road, visited seldom by any one, and for a long while particularly difficult to traverse during and just after the rainy seasons.

Few persons in the olden time at which we are glancing ever dreamed that the intersection of Yonge Street and King Street was to be the heart of the town. Yet here in one generation we have the Carfax of Toronto, as some of our forefathers would have called it—the Quatrevoies, or Grand Four-cross-way, where the golden milestone might be planted whence to measure distances in each direction.

What are the local mutations that are to follow? Will the needs of the population and the exigencies of business ever make of the intersection of Brock Street and Queen Street what the intersection of Yonge and King Street is now?

In the meantime, those who recall the very commonplace look which this particular spot, viz., the intersection of King Street and Yonge Street long wore, when as yet only recently reclaimed from nature, cannot but experience a degree of mental amazement whenever now they pause for a moment on one of the crossings and look around.

A more perfect and well-proportioned rectangular meeting of four great streets is seldom to be seen. Take the view at this point, north, south, west, or east, almost at any hour and at any season of the year, and it is striking.

It is striking in the freshness and coolness and comparative quiet of early morning, when few are astir.

It is striking in the brightness and glow of noon, when the sons and daughters of honest toil are trooping in haste to their mid-day meal.

A few hours later, again, it is striking when the phaetons, pony-carriages, and fancy equipages generally, are out, and loungers of each sex are leisurely promenading, or here and there placidly engaged in the inspection and occasional selection of "personal requisites," of some one or other of the variegated tissues or artificial adjuncts demanded by the modes of the period, while the westering sun is now flooding the principal thoroughfare with a misty splendour, and on the walls, along on either side, weird shadows slanting and elongated, are being cast.

Then, later still, the views here are by no means ordinary ones, when the vehicles have for the most part withdrawn, and the passengers are once more few in number, and the lamps are lighted, and the gas is flaming in the windows.

Even in the closed-up sedate aspect of all places of business on a Sunday or public holiday, statutable or otherwise, these four streets, by some happy charm, are fair to see and cheery. But when dressed for a festive gala occasion, when gay with banners and festoons, in honour of a royal birth-day, a royal marriage, the visit of a prince, the announcement of a victory, they shew to special advantage.

So, also, they furnish no inharmonious framework or setting, when processions and bands of music are going by, or bodies of military, horse or foot, or pageants such as those that in modern times accompany a great menagerie in its progress through the country—elephants in oriental trappings, teams of camels clad in similar guise, cavaliers in glittering mediæval armour, gorgeous cars and vans.

And again, in winter, peculiarly fine pictures, characteristic of the season, are presented here when, after a plentiful fall of snow, the sleighs are on the move without number and in infinite variety; or when, on the contrary, each long white vista, east, west, north, and south, glistening, perhaps, under a clear December moon, is a scene almost wholly of still life—scarcely a man or beast abroad, so keen is the motionless air, the mercury having shrunk down some way below the zero-line of Fahrenheit.

But we must proceed. From the Lake to the Landing is a long journey.

In the course of our perambulations we have already noticed some instances in the town of long persistency in one place of business or residence. Such evidences of staidness and substantiality are common enough in the old world, but are of necessity somewhat rare amid the chances, changes, and exchanges of young communities on this continent. An additiona

instance we have to note here, at the intersection of King Street and Yonge Street. At its north-east angle, where, as in a former section we have observed, stood the sole building in this quarter, the house of Mr. John Dehnis, for forty years at least has been seen with little alteration of external aspect, the Birmingham, Sheffield, and Wolverhampton warehouse of the brothers Mr. Joseph Ridout and Mr. Percival Ridout. A little way to the north, too, on the east side, the name of Piper has been for an equal length of time associated uninterruptedly with a particular business; but here, though outward appearances have remained to some extent the same, death has wrought changes. Near by, also, we see foundries still in operation where Messrs. W. B. Sheldon, F. R. Dutcher, W. A. Dutcher, Samuel Andrus, J. Vannorman and B. Vannorman, names familiar to all old inhabitants, were among the foremost in that kind of useful enterprise in York. Their advertisement, as showing the condition of one branch of the iron manufacture in York in 1832, will be of interest. Some of the articles enumerated have become old-fashioned. "They respectfully inform their friends and the public that they have lately made large additions to their establishments. They have enlarged their Furnace so as to enable them to make Castings of any size or weight used in this province, and erected Lathes for turning and finishing the same. They have also erected a Steam Engine of *tén-horse power*, of their own manufacture, for propelling their machinery, which is now in complete operation, and they are prepared to build Steam Engines of any size, either high or low pressure. Having a number of experienced engineers employed, whose capability cannot be doubted, they hope to share the patronage of a generous public. They always keep constantly on hand and for sale, either by wholesale or retail, Bark Mills, Cooking, Franklin, Plate, and Box Stoves, also, a general assortment of Hollow Ware, consisting of: Kettles, from one to one hundred and twenty gallons; Bake-Ovens, Bake-Basins, Belly-Pots, High Pans, Tea-Kettles, Wash-Kettles, Portable Furnaces, &c. Also are constantly manufacturing Mill-Gearing of all kinds; Sleigh Shoes, 50, 56, 30, 28, 15, 14, and 7 pound weights, Clock and Sash Weights, Cranes, Anvils, Cart and Waggon Boxes, Clothiers' Plates, Plough Castings, and Ploughs of all kinds." In 1832 Mr. Charles Perry was also the proprietor of foundries in York, and we have him advertising in the local paper that "he is about adding to his establishment the manufacture of Printing Presses, and that he will be able in a few weeks to produce Iron Printing Presses combining the latest improvements."

We move on now towards Newgate Street, first noticing that nearly opposite to the Messrs. Sheldon and Dutcher's foundry were the spirit vaults of Mr. Michael Kane, father of Paul Kane, the artist of whom we have spoken previously. At the corner of Newgate Street is Adelaide Street, on the left, and stretching along the southern side of that street, the famous tannery-yard of Mr. Jesse Ketchum was to be seen, with high stacks of hemlock-bark piled up on the Yonge Street side. On the north side of Newgate Street, at the angle opposite, was his residence, a large white building in the American style, with a square turret, bearing a railing, rising out of the ridge of the roof. Before pavements of any kind were introduced in York, the sidewalks hereabout were rendered clean and comfortable by a thick coating of tan-bark. Mr. Ketchum emigrated hither from Buffalo at an early period. In 1806 we find him named at the annual "town meeting," one of the overseers of highways and fence viewers. His section was from "No. 1 to half the Big Creek Bridge [Hogg's Hollow] on Yonge Street." Mr. Wm. Marsh, jun., then took up the oversight from half the Big Creek Bridge to No. 17. He came over in the first instance to look after the affairs of an elder brother, deceased, who had settled here and founded the tannery works. Jesse then continued to be a householder of York until about 1845, when he returned to Buffalo, his original home, where he still retained valuable possessions. He was familiarly known in Buffalo in later years as "Father Ketchum," and was distinguished for the lively practical interest which he took in schools for the young, and for the largeness of his annual contributions to such institutions. Two brothers, Henry and Zebulun, were also early inhabitants of Buffalo. Mr. Ketchum's York property extended to Lot Street. Hospital Street (Richmond Street) passed through it, and he himself projected and opened Temperance Street. To the facility with which he supplied building sites for moral and religious uses it is due that at this day the quadrilateral between Queen Street and Adelaide Street, Yonge Street and Bay Street, is a sort of miniature Mount Athos, a district curiously crowded with places of worship. He gave in Yorkville also sites for a school-house and temperance hall, and, besides, two acres for a Childrens' Park. The Bible and Tract Society likewise obtained its House on

Yonge Street on easy terms from Mr. Ketchum, on the condition that the Society should annually distribute in the Public Schools the amount of the ground rent in the form of books—a condition that continues to be punctually fulfilled. The ground-rent of an adjoining tenement was also secured to the Society by Mr. Ketchum, to be distributed in Sunday Schools in a similar way. Thus by his generous gifts and arrangements in Buffalo, and in our own town and neighbourhood, his name has become permanently enrolled in the list of public benefactors in two cities. Among the subscriptions to a "Common School" in York in 1820, a novelty at the period, we observe his name down for one hundred dollars. Subscriptions of that amount to any object were not frequent in York in 1820. (Among the contributors to the same school we observe Jordan Post's name down for £17 6s. 3d.; Philip Kluger's for £2 10s.; Lardner Bostwick's for £2 10s.) Mr. Ketchum died in Buffalo in 1867. He was a man of quiet, shrewd, homely appearance and manners, and of the average stature. His brother Seneca was also a character well known in these parts for his natural benevolence, and likewise for his desire to offer counsel to the young on every occasion. We have a distinct recollection of being, along with several young friends, the objects of a well-intended didactic lecture from Seneca Ketchum, who, as we were amusing ourselves on the ice, approached us on horseback.

It seems singular to us, in the present day, that those who laid out the region called the "New Town," that is, the land westward of the original town-plot of York, did not apparently expect the great northern road known as Yonge Street ever to extend directly to the water's edge. In the plans of 1800, Yonge Street stops short at Lot Street, i. e., Queen Street. A range of lots blocks the way immediately to the south. The traffic from the north was expected to pass down into the town by a thoroughfare called Toronto Street, three chains and seven links to the east of the line of Yonge Street. Mr. Ketchum's lot, and all the similar lots southward, were bounded on the east by this street. The advisability of pushing Yonge Street through to its natural terminus must have early struck the owners of the properties that formed the obstruction. We accordingly find Yonge Street in due time "produced" to the Bay. Toronto Street was then shut up, and the proprietors of the land through which the northern road now ran received in exchange for the space usurped proportionate pieces of the old Toronto Street. In 1818 deeds for these fragments, executed in conformity with the ninth section of an Act of the local Parliament, passed in the fiftieth year of George III., were given to Jesso Ketchum, William Bowkett, mariner, son of William Bowkett, and others, by the surveyors of highways, James Miles for the Home District, and William Richardson Caldwell for the County of York, respectively.

The street which supplied the passage-way southward previously afforded by Toronto Street, and which now formed the easterly boundary of the easterly portions of the lots cut in two by Yonge Street, was, as we have had occasion already to state in another place, called Upper George Street, and afterwards Victoria Street.

(The line of the now-vanished Toronto Street is, for purposes of reference, marked with fine lines on the map of Toronto by the Messrs. H. J. and J. O. Browne.)

What the condition of some of the lots to which we have been just referring was in 1801 we gather from a surveyor's report of that date. The Government had issued an order to examine how far the settlement duties had been fulfilled by the occupants of lots in this locality. As a result of this order we have a "Sketch of the Part of the Town of York, west of Toronto Street," consisting of a collection of squares, some blank, some coloured blue, some coloured black, to which the following explanation is attached: "The blank lots are cleared agreeable to the notice issued from his Excellency the Lieutenant-Governor, bearing date September the fourth, 1800. The lots shaded blue are chiefly cut, but the brush not burnt; and those marked with the letter A, the brush only cut. The lots shaded black, no work done. This survey made by order of the Surveyor-General's office, bearing date April the 23rd, 1801." The report was held to be not sufficiently complete and explicit. Another was demanded. The explanation of the choquers in the second sketch is as follows: 1st. The blank lots are cleared. 2nd. The lots shaded black, no work done. 3rd. The lots shaded brown, the brush cut and burnt. 4th. The lots shaded blue, the brush cut and not burnt. N. B. The lots 1 and 2 on the north side of Newgate Street (these are Mr. Ketchum's lots), are mostly clear of the large timber, and some brush cut also, but not burnt; therefore omitted in the first Report. This second examination done by order of the Honourable John Elmsley, Esq., and performed by (the name is

gone, but it was that of Mr. John Stegman, a well-known early Deputy Provincial Surveyor, of whom we shall hear again). In 1800 the following order had been issued to him by the acting Surveyor-General, D. W. Smith: "S. G. O., 19th Dec., 1800. Mr. John Stegman: Sir,—All persons claiming to hold land in the town of York, having been required to cut and burn all the brush and underwood on the said lots, and to fall all the trees which are standing thereon, you will be pleased to report to me, without delay, the number of the particular lots on which it has not been done. D. W. Smith, A. S. G." The sketches of "the part of the Town of York, west of Toronto Street," just described, were doubtless prepared by Mr. John Stegman, in obedience to this order from the Surveyor-General's office.

The continuation of the great northern highway in a continuous right line to the Bay from its point of issue on Lot Street, *i. e.*, Queen Street, was the circumstance that eventually created for Yonge Street, regarded as a street in the usual sense, the peculiar renown which it popularly has for extraordinary length. A story is told of a tourist, newly arrived at York, wishing to utilize a stroll before breakfast by making out as he went along the whereabouts of a gentleman to whom he had a letter. Passing down the hall of his hotel, he asks in a casual way of the book-keeper—"Can you tell me where Mr. So-and-so lives? (leisurely producing the note from his breast-pocket wallet). It is somewhere along Yonge Street here in your town." "Oh yes," was the reply, when the address had been glanced at—"Mr. So-and-so lives on Yonge Street, about twenty-five miles up!" We have heard also of a serious denur on the part of a Quebec naval and military inspector, at two agents for purchases being stationed on one street at York. However surprised, he was nevertheless satisfied when he learned that their posts were thirty miles apart. Let us now direct our attention to Yonge Street north of Queen Street.

#### XLV.—YONGE STREET—FROM QUEEN STREET TO CARLETON STREET.

For some years previous to the opening of Yonge Street from Lot Street to the Bay, the portion of the great highway to the north, between Lot Street and the road which is now the southern boundary of Yorkville, was in an almost impracticable condition. The route was recognized, but no grading or causewaying had been done on it. In the popular mind, indeed, practically, the point where Yonge Street began as a travelled road to the north, was at Yorkville, as we should now speak. The track followed by the farmers coming into town from the north veered off at Yorkville to the eastward, and passed down in a haphazard kind of way over the sandy pineland in that direction, and finally entered the town by the route later known as Parliament Street. In 1800 the expediency was seen of making the direct northern approach to York more available. In the *Gazette* of Dec. 20th, 1800, we have an account of a public meeting held on the subject. It will be observed that Yonge Street, between Queen Street and Yorkville, as moderns would phrase it, is spoken of therein, for the moment, not as Yonge Street, but as "the road to Yonge Street." "On Thursday last, about noon," the *Gazette* reports, "a number of the principal inhabitants of this town met together in one of the Government Buildings, to consider the best means of opening the road to Yonge Street, and enabling the farmers there to bring their provisions to market with more ease than is practicable at present." The account then proceeds: "The Hon. Chief-Justice Elmsley was called to the chair. He briefly stated the purpose of the meeting, and added that a subscription-list had been lately opened by which something more than two hundred dollars in money and labour had been promised, and that other sums were to be expected from several respectable inhabitants who were well-wishers to the undertaking, but had not as yet contributed towards it. These sums, he feared, however, would not be equal to the purpose, which hardly could be accomplished for less than between five and six hundred dollars. Many of the subscribers were desirous that what was already subscribed should be immediately applied as far as it would go, and that other resources should be looked for. A paper was produced and read containing a proposal from Mr. Eliphalet Hale to open and make the road, or so much of it; as might be required, at the rate of twelve dollars per acre for clearing it where no causeway was wanted, four rods wide, and cutting the stumps in the two middle rods close to the ground; and seven shillings and sixpence, provincial currency, per rod, for making a causeway eighteen feet wide where a causeway might be wanted. Mr. Hale undertook to find security for the due performance of the work by the first of Febru-



ary following (1801). The subscribers present were unanimously of opinion that the subscription should be immediately applied as far as it would go. Mr. Hale's proposition was accepted, and a committee consisting of Mr. Secretary Jarvis, Mr. William Allan, and Mr. James Playter, was appointed to superintend the carrying of it into execution. Additional subscriptions would be received by Messrs Allan and Wood." At the same meeting a curious project was mooted, and a resolution in its favour adopted, for the permanent shutting up of a portion of Lot Street, and selling the land, the proceeds to be applied to the improvement of Yonge Street. There was no need of that portion of Lot Street, it was argued, there being already convenient access to the town in that direction by a way a few yards to the south. We gather from this that Hospital Street (Richmond Street) was the usual beaten track into the town from the west. "It had been suggested," says the report of the meeting, "that considerable aid might be obtained by shutting up the street which now forms the northern boundary of the town between Toronto Street and the Common, and disposing of the land occupied by it. This street, it was conceived, was altogether superfluous," the report continues, "as another street equally convenient in every respect runs parallel to it at the distance of about ten rods; but it could not be shut up and disposed of by any authority less than that of the Legislature." A petition to the Legislature embodying the above ideas was to lie for signature at Mr. McDougal's Hotel.

The proposed document may have been duly presented, but the Legislature certainly never closed up Lot Street. Owners of park lots westward of Yonge Street may have had their objections. The change suggested would have compelled them to buy not only the land occupied by Lot Street, but also the land immediately to the south of their respective lots; otherwise they would have had no frontage in that direction.

The money collected was, we suppose, satisfactorily laid out by Mr. Hale, but it did not suffice for the completion of the contemplated work. From the *Gazette* of Feb. 20 in the following year (1802), we learn that a second subscription was started for the purpose of completing the communication with the travelled part of Yonge Street to the north. In the *Gazette* just named we have the following, under date of York, Saturday, Feb. 20, 1802: "We whose names are hereunto subscribed, contemplating the advantage which must arise from the rendering of Yonge Street accessible and convenient to the public, and having before us a proposal for completing that part of the said street between the Town of York and lot No. 1, do hereby respectively agree to pay the sums annexed to our names towards the carrying of the said proposal into effect; cherishing at the same time the hope that every liberal character will give his support to a work which has for its design the improvement of the country, as well as the convenience of the public: \*the Chief-Justice, 100 dollars; \*Receiver-General, \$20; \*Robt. J. D. Grey, \$20 (and two acres of land when the road is completed); John Cameron, \$40; \*Jas. Macaulay, \$20; \*Alexander Wood, \$20; \*William Weckes, \$20; John McGill, \$16; Wilson, Humphreys and Campbell, \$15; D. W. Smith, \$10; Thomas Scott, \$10; \*Wm. Jarvis, \$10; \*John Small, \$10; \*David Burns, \$10; \*Wm. Allan, \$10; Alex. McDonell, \$10; Wm. Smith, \$10; Robert Henderson, \$10; \*Simon McNabb, \$5; John McDougal, \$5; D. Cozens, \$5; Thomas Ward, \$5; \*Elisha Beaman, \$6; Jos. Hunt, \$6; Eli Playter, \$6; John Bennett, \$6; \*George Cutter, \$6; James Norris, \$5; Wm. B. Peters, \$5; John Leach, \$5; John Titus, \$5; Wm. Cooper, \$5; \*Wm. Hunter, \$5; J. B. Cozens, \$5; \*Daniel Tiers, \$5; Thomas Forfar, \$5; Samuel Nash, \$5; Paul Mariani, \$3; Thomas Smith, \$3; John McBeath, \$3." It is subjoined that "subscriptions will be received by Mr. S. McNabb, Secretary, and advertised weekly in the *Gazette*. Those marked thus (\*) have paid a former subscription."

In the *Gazette* of March 6, 1802, an editorial is devoted to the subject of the improvement of Yonge Street. It runs as follows: "It affords us much pleasure to state to our readers that the necessary repair of Yonge Street is likely to be soon effected, as the work, we understand, has been undertaken with the assurance of entering upon and completing it without delay; and by every one who reflects upon the present sufferings of our industrious community on resorting to a market, it cannot but prove highly satisfactory to observe a work of such convenience and utility speedily accomplished. That the measure of its future benefits must be extreme indeed; we may reasonably expect; but whilst we look forward with flattering expectations of these benefits, we cannot but appreciate the immediate advantage which is afforded to us, in being relieved from the application of the statute labour to circuitous bye-paths and

occasional roads, and in being enabled to apply the same to the improvement of the streets, and the nearer and more direct approaches to the Town." The irregular track branching off eastward at Yorkville was an example of these "circuitous bypaths and occasional roads." Editorials were rare at the period. Had there been more of them, subsequent investigators would have been better able than they are, to reproduce pictures of the olden time. Chief-Justice Elmsley was possibly the inspirer of the *Gazette* in the present instance. The meagreness and incompleteness of the record of local affairs in the official paper are often tantalizing.

The work appears to have been duly proceeded with. In the following June, we have an advertisement calling a meeting of the committee entrusted with its superintendence. In the *Gazette* of June 12, 1802, we read: "The committee for inspecting the repair of Yonge Street requests that the subscribers will meet on the repaired part of said street at 5 o'clock on Monday evening, to take into consideration how far the moneys subscribed by them have been beneficially expended: S. McNabb, Secretary to Committee. York, 10th June, 1802."

These early efforts of our predecessors to render practicable the great northern approach to the town, are deserving of respectful remembrance.

The nature of the soil at many points between Lot Street and the modern Yorkville was such as to render the construction of a road that should be comfortably practicable at all seasons of the year no easy task. Down to the time when macadam was at length applied, some twenty-eight years after Mr. Hale's operations, this approach to the town was notorious for its badness every spring and autumn. At one period an experiment was tried of a wooden tramway for a short distance at the worst part, on which the loaded waggons were expected to keep and so be saved from sinking hopelessly in the direful sloughs. Mr. Sheriff Jarvis was the chief promoter of this improvement, which answered its purpose for a time, and Mr. Rowland Burr was its suggester. But we must not forestall ourselves.

We return to the point where Lot Street, or Queen Street, intersects the thoroughfare which we are about to traverse.

After passing Mr. Jesse Ketchum's property, which had been divided into two parts by the pushing of Yonge Street southward to its natural termination, we arrived at another striking rectangular meeting of thoroughfares. Lot Street having happily escaped extinction westward and eastward, there was created at this spot a four-cross-way possessed of an especial historic interest, being the conspicuous intersection of the two great military roads of Upper Canada, projected and explored in person by its first organiser. Four extensive reaches, two of Dundas Street (identical, of course, with Lot or Queen Street), and two of Yonge Street, can here be contemplated from one and the same standpoint. In the course of time the views up and down the four long vistas here commanded will probably rival those to be seen at the present moment where King Street crosses Yonge Street. When lined along all its sides with handsome buildings, the superior elevation above the level of the Lake of the more northerly quadrivium will be in its favour.

Perhaps it will here not be out of order to state that Yonge Street was so named in honour of Sir George Yonge, Secretary of War in 1791. The first exploration which led to the establishment of this communication with the north, was made in 1793. On the early M.S. map mentioned before in these papers, the route taken by Governor Simcoe on the memorable occasion, in going and returning, is shown. Explanatory of the red dotted lines which indicate it, the following note is appended. It reveals the Governor's clear perception of the commercial and military importance of the projected road: "Lieut.-Gov. Simcoe's route on foot and in canoes to explore a way which might afford communication for the Fur-traders to the Grand Portage, without passing Detroit in case that place were given up to the United States. The march was attended with some difficulties, but was quite satisfactory: an excellent harbour at Penetanguishene; returned to York 1793."

(On the same map, the tracks are given of four other similar excursions, with the following accounts appended respectively: 1. Lieut.-Gov. Simcoe's route on foot from Niagara to Detroit and back again in five weeks; returned to Niagara March 8th, 1793. 2. Lieut.-Gov. Simcoe's route from York to the Thames; down that river in canoes to Detroit; from thence to the Missis to build the fort Lord Dorchester ordered to be built: left York March 17th, 1794; returned by Lake Erie and Niagara to York May 5th, 1794. 3. Lieut.-Gov. Simcoe's track from York to Kingston in an open boat, Dec. 5th, 1794. 4. Lieut.-Gov. Simcoe's route from Niagara

to Long Point on Lake Erie, on foot and in boats: returned down the Ouse (Grand River): from thence crossed a portage of five miles to Welland River, and so to Fort Chippewa, September, 1795.)

The old chroniclers of England speak in high praise of a primeval but somewhat mythic king of Britain, named Belin:

“Belin well held his honour,  
And wisely was good governour,”

says Peter de Langtoft, and his translator, Robert de Brunne; and they assign, among the reasons why he merited such mention at their hands, the following:

“His land Britaine he yode throughout,  
And ilk county beheld about;  
Beheld the woods, water and fen.  
No passage was naked for men,  
No highe street thorough countrie,  
No to borough ne citié.  
Thorough mooris, hills and valleys  
He madé brigs and causeways,  
Highe street for common passage,  
Brigs over water did he stage.”

This notice of the old chroniclers' pioneer king of Britain has again and again recurred to us as we have had occasion to narrate the energetic doings of the first ruler of Upper Canada, here and previously. What Britain was when Belin and his Celts were at work, Canada was in the days of our immediate fathers—a trackless wild. That we see our country such as it is to-day, approaching in many respects the beauty and agricultural finish of Britain itself, is due to the intrepid men who faced without bleaching the trials and perils inevitable in a first attack on the savage fastnesses of nature.

A succinct but good account is given of the origin of Yonge Street in Mr. Surveyor General D. W. Smith's Gazetteer of 1799. The advantages expected to accrue from the new highway are clearly set forth; and though the anticipations expressed have not been fulfilled precisely in the manner supposed, we see how comprehensive and really well-laid were the plans of the first organizer of Upper Canada.

“Yonge Street,” the early Gazetteer says, “is the direct communication from York to Lake Simcoe, opened during the administration of his Excellency Major-General Lieutenant Governor Simcoe, who, having visited Lake Huron by Lake aux Claiés (formerly also Ouentaronk, or Sinjon, and now named Lake Simcoe), and discovered the harbour of Penetanguishene (now Gloucester) to be fit for shipping, resolved on improving the communication from Lake Ontario to Lake Huron, by this short route, thereby avoiding the circuitous passage of Lake Erie. This street has been opened in a direct line, and the road made by the troops of his Excellency's corps. It is thirty miles from York to Holland's river, at the Pine Fort called Gwillimbury, where the road ends; from thence you descend into Lake Simcoe, and, having passed it, there are two passages into Lake Huron; the one by the river Severn, which conveys the waters of Lake Simcoe into Gloucester Bay; the other by a small portage, the continuation of Yonge Street, to a small lake, which also runs into Gloucester Bay. This communication affords many advantages; merchandize from Montreal to Michilimackinac may be sent this way at ten or fifteen pounds less expense per ton, than by the route of the Grand or Ottawa River; and the merchandize from New York, to be sent up the North and Mohawk Rivers for the north-west trade, finding its way into Lake Ontario at Oswego (Fort Ontario), the advantage will certainly be felt of transporting goods from Oswego to York, and from thence across Yonge Street, and down the waters of lake Simcoe into lake Huron, in preference to sending it by lake Erie.”

We now again endeavour to effect a start on our pilgrimage of retrospection up the long route, from the establishment of which so many public advantages were predicted in 1799.

The objects that came to be familiar to the eye at the entrance to Yonge Street from Lot Street were, after the lapse of some years, on the west side, a large square white edifice known as the Sun Tavern, Elliott's; and on the east side, the buildings constituting Good's Foundry.

The open land to the north of Elliott's was the place generally occupied by the travelling menageries and circuses when such exhibitions began to visit the town.

The foundry, after supplying the country for a series of years with ploughs, stoves and other useful and necessary articles of heavy hardware, is memorable as having been the first in Upper Canada to turn out real railway locomotives. When novelties, these highly finished ponderous machines, seen slowly and very laboriously urged through the streets from the foundry to their destination, were startling phenomena. We have in the *Canadian Journal* (vol. ii. p. 70), an account of the first engine manufactured by Mr. Good from the Toronto Locomotive Works, with a lithographic illustration. "We have much pleasure," the editor of the *Canadian Journal* says, "in presenting our readers with a drawing of the first locomotive engine constructed in Canada, and indeed, we believe, in any British Colony. The 'Toronto' is certainly no beauty, nor is she distinguished for any peculiarity in the construction, but she affords a very striking illustration of our progress in the mechanical arts, and of the growing wants of the country. The 'Toronto' was built at the Toronto Locomotive Works, which were established by Mr. Good, in October, 1852. The order for the 'Toronto' was received in February, 1853, for the Ontario, Simcoe and Huron Railroad. The engine was completed on the 16th of April, and put on the track the 26th of the same month. Her dimensions are as follows: cylinder 16 inches diameter, stroke 22 inches, driving wheel 5 feet 6 inches diameter, length of internal fire box 4 feet 6 inches, weight of engine 25 tons, number of tubes 150, diameter of tubes 2 inches."

With property a little to the north on the east side, the name of McIntosh was early associated, and—Canadian persistency again—is still associated. Of Captains John, Robert and Charles McIntosh, we shall have occasion to speak in our paper on the early Marine of York harbour. It was opposite the residence of Capt. John McIntosh that the small riot took place, which signaled the return home of William Lyon Mackenzie, in 1849, after the civil tumults of 1837. Mr. Mackenzie was at the time the guest of Captain McIntosh, who was related to him through a marriage connexion.

Albert Street, which enters Yonge Street opposite the McIntosh property, was in 1833 still known as Macaulay Lane, and was described by Walton as "fronting the Fields." From this point a long stretch of fine forest-land extended to Yorkville. On the left side it was the property partly of Dr. Macaulay and partly of Chief Justice Elmsley. The fields which Macaulay Lane fronted were the improvements around Dr. Macaulay's abode. The white entrance gate to his house was near where now a street leads into Trinity Square. Wykham Lodge, the residence of Sir James Macaulay after the removal from Front Street, and Elmsley Villa, the residence of Captain J. S. Macaulay, (Government House in Lord Elgin's day, and subsequently Knox College,) were late erections on portions of these spacious suburban estates.

At first Dr. Macaulay and Chief Justice Elmsley selected two adjoining park lots, both of them fronting, of course, on Lot Street. They then effected an exchange of properties with each other. Dividing these two lots transversely into equal portions, the Chief Justice chose the upper or northern halves, and Dr. Macaulay the lower or southern. Dr. Macaulay thus acquired a large frontage on Lot Street, and the Chief Justice a like advantage on Yonge Street. Captain Macaulay acquired his interest in the southern portion of the Elmsley halves by marriage with a daughter of the Chief Justice. The northern portion of these halves descended to the heir of the Chief Justice, Capt. John Elmsley, who having become a convert to the Church of Rome, gave facilities for the establishment of St. Basil's college and other Roman Catholic institutions on his estate. Of Ch. Jus. Elmsley and his son we have previously spoken. (See sections v., ix. and xxxv.)

Dr. Macaulay's clearing on the north side of Macaulay lane was, in relation to the first town plot of York, long considered a locality particularly remote; a spot to be discovered by strangers not without difficulty. In attempting to reach it we have distinct accounts of persons bewildered and lost for long hours in the intervening marshes and woods. Mr. Justice Boulton, travelling from Prescott in his own vehicle, and bound for Dr. Macaulay's domicile, was dissuaded; on reaching Mr. Small's house at the eastern extremity of York, from attempting to push on to his destination, although it was by no means late, on account of the inconveniences and perils to be encountered, and half of the following day was taken up in accomplishing the residue of the journey. Dr. Macaulay's cottage might still have been existent and in good order; but while it was being removed bodily by Mr. Alexander Hamilton, from its original site

to a position on the entrance of Trinity Square, a few yards to the eastward, it was burnt, either accidentally or by the act of an incendiary. Mr. Hamilton, who was intending to convert the building into a home for himself and his family, gave the name of Teraulay Cottage—the name by which the destroyed building had been known to the house for himself which he put up in its stead.

A quarter of a century sufficed to transform Dr. Macaulay's garden and grounds into a well-peopled city district. The "fields," of which Walton spoke, have undergone the change which St. George's Fields and other similar spaces have undergone in London :

St. George's Fields are fields no more ;  
 The trowel supersedes the plough ;  
*Hugo inundated swamps of yore*  
 Are changed to civic villas now.  
 The bullder's plank, the mason's hod,  
 Wide and more wide extending still,  
 Usurp the violated sod.

The area which Dr. Macaulay's homestead immediately occupied now constitutes Trinity Square—a little bay by the side of a great stream of busy human traffic, ever ebbing and flowing, not without rumble and other resonances ; a quiet close, resembling, it is pleasant to think, one of the Inns of Court in London, so tranquil despite the turmoil of Fleet Street adjoining. Trinity Square is now completely surrounded with buildings, nevertheless an aspiring attic therein, in which many of these collections and recollections have been reduced to shape, has the advantage of commanding to this day a view still showing within its range some of the primitive features of the site of York. To the north an extended portion of the rising land above Yorkville is pleasantly visible, looking in the distance as it anciently looked, albeit beheld now with spires intervening, and ornamental turrets of public buildings, and lofty factory flues : while to the south, seen also between chimney stacks and steeples and long solid architectural ranges, a glimpse of lake Ontario itself is procurable—a glimpse especially precious so long as it is to be had, for not only recalling, as it does, the olden time when "the Lake" was an element in so much of the talk of the early settlers—its sound, its aspect, its condition being matters of hourly observation to them—but also suggesting the thought of the far-off outer ocean-stream—the silver moat that guards the fatherland, and that forms the horizon in so many of its landscapes. To the far-off Atlantic, and to the misty isles beyond—the true *Insule Fortunatæ*—we need not name them—the glittering slip which we are still permitted to see yonder is the highway—the route by which the fathers came—the route by which their sons from time to time return to make dutiful visits to hearthstones and shrines never to be thought of or named without affection and reverence. Of that other ideal ocean-stream too, and of that other ideal home, of which the poet speaks, our peep of Ontario may likewise to the thoughtful be an allegory, by the help of which

In a season of calm weather,  
 Though inland far we be,  
 Our souls have sight of that immortal sea  
 Which brought us hither ;  
 Can in a moment travel thither—  
 And see the children sport upon the shore,  
 And hear the mighty waters rolling evermore !

#### XLVI.—YONGE STREET—FROM CARLETON STREET TO YORKVILLE.

In the grove which surrounded Sir James Macaulay's residence, Wykham Lodge, we had down to recent years a fragment of the fine forest which lined Yonge Street, almost continuously from Lot Street to Yorkville, some forty years since. The ruthless uprooting of the eastern border of this beautiful sylvan relic of the past, for building purposes, was painful to witness, however quickly the presence of rows of useful structures reconciled us to the change. The trees which cluster round the great school building in the rear of these improvements will long, as we hope, survive to give an idea of what was the primeval aspect of the whole of the neighbourhood.

The land on the opposite side, a little to the north of the point at which we have arrived, viz., Carleton Street—long remaining in an uncultivated condition, was a portion of the estate of Mr. Alexander Wood, of whom we have already spoken. His family and baptismal names are preserved, as we have before noted, in "Wood" Street and "Alexander" Street.

The streets which we passed southward of Wood Street, Carleton, Gerrard, Shuter, with Gould Street in the immediate vicinity, had their names from personal friends of Mr. McGill, the first owner, as we have seen, of this tract. They are names mostly associated with the early annals of Montreal, and seemed rather inapposite here.

Northward, a little beyond where Grosvenor Street leads into what was Elmsley villa, and is now Knox College, was a solitary green field with a screen of lofty trees on three of its sides. In its midst was a Dutch barn, or hay-barrack, with moveable top. The sword on the northern side of the building was ever eyed by the passer-by with a degree of awe. It was the exact spot where a fatal duel had been fought. We have seen in repeated instances that the so-called code of honour was in force at York from the era of its foundation. "Without it," Mandeville had said, "there would be no living in a populous nation. It is the tie of society; and although we are beholders of our frailties for the chief ingredient of it, there has been no virtue, at least that I am acquainted with, which has proved half so instrumental to the civilizing of mankind, who, in great societies, would soon degenerate into cruel villains and treacherous slaves, were honour to be removed from among them." Mandeville's sophistical dictum was blindly accepted, and trifles light as air gave rise to the conventional hostile meeting. The merest accident at a dance, a look, a jest, a few words of unconsidered talk, of youthful chaff, were every now and then sufficient to force persons who previously, perhaps, had been bosom friends, companions from childhood, along with others sometimes, in no wise concerned in the quarrel at first, to put on an unnatural shew of thirst for each other's blood. The victim of the social usage of the day, in the case now referred to, was a youthful son of Surveyor-General Ridout.

Some years after the event, the public attention was drawn afresh to it. The surviving principal in the affair, Mr. Samuel Jarvis, underwent a trial at the time and was acquitted. But the seconds were not arraigned. It happened in 1828, eleven years after the incident (the duel took place July 12, 1817), that Francis Collins, editor of the *Canadian Freeman*, a paper of which we have before spoken, was imprisoned and fined for libel. As an act of retaliation on at least some of those who had promoted the prosecution, which ended in his being thus sentenced, he set himself to work to bring the seconds into court. He succeeded. One of them, Mr. Henry John Boulton, was now Solicitor-General, and the other, Mr. James E. Small, an eminent member of the Bar. All the particulars of the fatal encounter, were once more gone over in the evidence. But the jury did not convict.

Modern society, here and elsewhere, is to be congratulated on the change which has come over its ideas in regard to duelling. Apart from the considerations dictated by morals and religion, common sense, as we suppose, has had its effect in checking the practice. York, in its infancy, was no better and no worse in this respect than other places. It took its cue in this as in some other matters, from very high quarters. The Duke of York, from whom York derived its name, had himself narrowly escaped a bullet from the pistol of Colonel Lennox: "it passed so near to the ear as to discommode the side-curly," the report said; but our Duke's action, or rather inaction, on the occasion helped perhaps to impress on the public mind the irrationality of duelling: he did not return the fire. "He came out," he said, "to give Colonel Lennox satisfaction, and did not mean to fire at him; if Colonel Lennox was not satisfied, he might fire again."

Just to the north of the scene of the fatal duel, which has led to this digression, was the portion of Yonge street where a wooden tramway was once laid down for a short distance; an experiment interesting to be remembered now, as an early foreshadowing of the existing convenient street railway, if not of the great Northern Railway itself. Subterranean springs and quicksands hereabout rendered the primitive roadmaker's occupation no easy one; and previous to the application of macadam, the tramway, while it lasted, was a boon to the farmers after heavy rains.

Mr. Durand's modest cottage and bowery grounds, near here, recall at the present day, an early praiseworthy effort of its owner to establish a local periodical devoted to Literature and

Natural History, in conjunction with an advocacy of the cause of Temperance. A diligent attention to his profession as a lawyer did not hinder the editor of the *Literary Gem* from giving some of his leisure time to the observation and study of Nature. We accordingly have in the columns of that periodical numerous notes of the fauna and flora of the surrounding neighbourhood, which for their appreciativeness, simplicity, and minuteness, remind us of the picturesque pages of White's "Natural History of Selborne." The *Gem* appeared in 1851-2, and had an extensive circulation. It was illustrated with good wood cuts, and its motto was "Humanity, Temperance, Progress." The place of its publication, a small white office still to be seen adjoining the cottage which we are now passing, was indicated by a square label suspended at the right-hand side of the door. The father of Mr. Durand was an Englishman of Huguenot descent, who emigrated hither from Abergavenny at a very early period. Having been previously engaged in the East India mercantile service he undertook the importation of East India produce. After reaching Quebec and Montreal in safety, his first consignments, embarked in batteaux, were swallowed up bodily in the rapids of the St. Lawrence. He nevertheless afterwards prospered in his enterprise, and acquired property. The site of the present city of Hamilton was once almost wholly his. The county of Halton returned him to Parliament as its representative; and in 1817 he enjoyed the distinction of being expelled from the House. A Parliament had recently expired. He offered some criticisms on its proceedings in an Address to his late constituents. The new House, which contained many persons who had been members of the former Parliament, was persuaded to vote the Address to the electors of Halton a libel, to exclude its author from the House, and to commit him to prison. His instant re-election by the county of Halton was of course secured. Up to 1812 Mr. Durand, senior, had edited a political journal, moderate and reasonable in tone, entitled the *Bee*, printed, we believe, at Niagara. From his evidence before the celebrated Grievance Committee of 1835, we observe that he was an early advocate of a number of changes, which have since been carried with effect. Mr. Durand, senior, died at Hamilton, in 1836.

Proceeding onward a few yards, we arrived, in former times, at what was popularly called the Sandhill—a moderate rise, showing where, in bygone ages, the lake began to shoal. An object of interest in the woods here, at the top of the rise, on the west side, was the "Indian's Grave," made noticeable to the traveller by a little civilized railing surrounding it. The story connected therewith was this. When the United States forces were landing in 1813, near the Humber Bay, with the intention of attacking the Fort and taking York, one of Major Givins's Indians concealed himself in a tree, and from that position fired into the boats with fatal effect repeatedly. He was soon discovered, and speedily shot. The body was afterwards found, and deposited with respect in a little grave here on the crest of the Sandhill, where an ancient Indian burying-ground had existed, though long abandoned. It would seem that by some means, the scalp of this poor Indian was packed up with the trophies of the capture of York, conveyed by Lieut. Dudley to Washington. From being found in company with the Speaker's Mace on that occasion, the foolish story arose of its having been discovered over the Speaker's chair in the Parliament building that was destroyed. "With the exception," says Ingersoll, in his History of the War of 1812-14, "of the English general's musical snuff-box, which was an object of much interest to some of our officers, and a scalp which Major Forsyth found suspended over the Speaker's chair, we gained but barren honour by the capture of York, of which no permanent possession was taken." Auchinleck, in his History of the same war, very reasonably observes, that "from the expertness of the backwoodsmen in scalping (of which he gives two or three instances), it is not at all unlikely that the scalp in question was that of an unfortunate Indian who was shot while in a tree by the Americans, in their advance on the town." It was rejected with disgust by the authorities at Washington, Ingersoll informs us, and was not allowed to decorate the walls of the War Office there. Colonel W. F. Coffin, in his "1812: The War and its Moral," asserts that a peruke or scratch-wig, found in the Parliament House, was mistaken for a scalp.

Building requirements have at the present day occasioned the almost complete obliteration of the Sandhill. Innumerable loads of the loose silex of which it was composed have been removed. The bones of the Indian brave, and of his forefathers, have been carted away. In a triturated condition, they mingle now, perhaps, in the mortar of many a wall in the vicinity.

A noble race! but they are gone,  
 With their old forests wide and deep,  
 And we have built our houses upon  
 Fields where their generations sleep.  
 Their fountains slake our thirst at noon,  
 Upon their fields our harvest waves,  
 Our lovers woo beneath their moon—  
 Then let us spare at least their graves!

Vain, however, was the poet's appeal. Even the prosaic proclamations of the civil power had but temporary effect. We quote one of them of the date of Dec. 14, 1797, having for its object the protection of the fishing places and burying grounds of the Mississaga Indians.

"Proclamation. Upper Canada. Whereas, many heavy and grievous complaints have of late been made by the Mississaga Indians, of depredations committed by some of his Majesty's subjects and others upon their fisheries and burial places, and of other annoyances suffered by them by uncivil treatment, in violation of the friendship existing between his Majesty and the Mississaga Indians, as well as in violation of decency and good order: Be it known, therefore, that if any complaint shall hereafter be made of injuries done to the fisheries and to the burial places of the said Indians, or either of them, and the persons can be ascertained who misbehaved himself or themselves in manner aforesaid, such person or persons shall be proceeded against with the utmost severity, and a proper example made of any herein offending. Given under my hand and seal of arms, at York, this fourteenth day of December, in the year of our Lord one thousand seven hundred and ninety-seven, and in the thirty-eighth year of his Majesty's reign. Peter Russell, President, administering the government. By his Honor's command, Alex. Burns, Secretary."

As to the particular ancient burial-plot on the sandhill north of York, however, it may perhaps be conjectured that prior to 1813 the Mississagas had transferred to other resting places the bulk of the relics which had been deposited there.

Off to the eastward of the sandy rise which we are ascending, was one of the early public nursery gardens of York, Mr. Frank's. Further to the north on the same side was another, Mr. Adams'. Mr. Adams was a tall, oval faced, fair-complexioned Scotchman. An establishment of the same kind at York more primitive still, was that of Mr. Bond, of whom we shall have occasion to speak by and by.

Kearsny House, Mr. Proudfoot's, the grounds of which occupy the site of Frank's nursery garden, is a comparatively modern erection, dating from about 1845, an architectural object regarded with no kindly glance by the ultimate holders of shares in the Bank of Upper Canada—an institution which in the infancy of the country had a mission and fulfilled it, but which grievously betrayed those of the second generation who, relying on its traditional sterling reputation, continued to trust it. With Kearsny House, too, is associated the recollection, not only of the president, so long identified with the Bank of Upper Canada, but of the financier, Mr. Cassels, who, as a kind of *deus ex machina*, engaged at an annual salary of ten thousand dollars, was expected to retrieve the fortunes of the institution, but in vain, although for a series of years after being pronounced moribund it continued to yield a handsome addition to the income of a number of persons.

Mr. Alexander Murray, subsequently of Yorkville, and a merchant of the olden time at York, occupied the residence which preceded Kearsny House, on the Frank property. One desires, in passing, to offer a tribute to the memory of a man of such genuine worth as was Mr. Murray, although the singular unobtrusiveness which characterized him when living seems almost to forbid the act.



METEOROLOGICAL REGISTER.

MONTHLY METEOROLOGICAL REGISTER, AT THE MAGNETICAL OBSERVATORY, TORONTO, ONTARIO, ---JULY, 1871  
 'Latitude—43° 39' 4" North. Longitude—8h. 17m. 33s. West. Elevation above Lake Ontario, 108 feet.

Day	Barom. at temp. of 82°.			Temp. of the Air.			Excess of Mean above Normal.			Tension of Vapour.			Humidity of Air.			Direction of Wind.			Velocity of Wind.			Rain in Inches.	Snow in Inches.	
	6 A.M.	10 P.M.	Mean.	5 A.M.	2 P.M.	10 P.M.	M	Z	N	0	2	10	A.M.	P.M.	M	U	10 P.M.	0 A.M.	2 P.M.	10 P.M.	6 A.M.			10 P.M.
1	29.638	29.574	29.576	67.8	67.7	68.4	0.4	0.5	0.7	351	439	417	394	73	64	71	65	N E	S E	S W	4.2	2.8	3.79	5.10
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...	29.570	29.540	29.555	69.75	69.63	69.65	0.98	1.03	1.09	409	426	425	424	85	67	78	72	...	...	...	3.62	9.72	3.92	5.67

REMARKS ON TORONTO METEOROLOGICAL REGISTER FOR JULY, 1871

COMPARATIVE TABLE FOR JULY.

YEAR	TEMPERATURE.				RAIN.		SNOW.		WIND.		
	Mean.	Excess above average.	Max. m. m.	Min. m. m.	Range.	No. of days.	Inches.	No. of days.	Inches.	Resulant Direc- tion.	Mean Velocity.
1843	64.5	- 2.8	86.8	38.7	48.1	8	4.605	0	0.0	o	0.44 lbs.
1844	66.0	- 1.3	86.6	40.1	46.5	12	2.815	0	0.0	...	0.19
1845	66.2	- 1.1	95.0	45.7	49.3	7	2.166	0	0.0	...	0.30
1846	68.0	+ 0.7	94.6	44.5	60.1	2	2.896	0	0.0	...	0.29
1847	68.0	+ 0.7	87.0	43.2	43.8	19	3.355	0	0.0	...	0.19
1848	66.5	+ 1.8	82.2	45.1	38.1	10	1.890	0	0.0	N 14 W	0.18
1849	68.4	+ 1.1	88.6	45.2	43.4	4	3.415	0	0.0	N 7 W	0.75
1850	68.9	+ 1.6	86.2	51.6	34.6	12	5.270	0	0.0	N 81 W	0.59
1851	68.9	+ 2.3	82.7	46.5	36.2	12	3.626	0	0.0	N 60 W	0.88
1852	66.8	- 0.5	80.1	48.5	41.9	8	4.025	0	0.0	N 43 W	0.93
1853	65.6	- 1.7	91.3	41.6	49.7	10	0.915	0	0.0	N 58 W	0.24
1854	72.5	+ 5.2	98.0	42.5	55.5	9	4.806	0	0.0	N 49 W	0.37
1855	67.9	+ 0.6	92.8	49.2	43.6	13	3.245	0	0.0	N 19 W	0.78
1856	69.9	+ 2.6	96.0	49.5	47.1	8	1.204	0	0.0	N 79 W	1.57
1857	67.8	+ 0.5	86.6	47.0	39.6	15	3.475	0	0.0	N 68 E	0.81
1858	67.9	+ 0.6	85.0	52.0	33.0	13	3.072	0	0.0	N 15 E	1.18
1859	66.9	- 0.4	88.0	44.7	43.3	12	2.611	0	0.0	N 56 W	1.48
1860	63.9	- 3.4	88.0	43.8	44.2	13	4.336	0	0.0	N 60 W	2.15
1861	66.4	- 1.9	84.5	47.0	37.5	16	2.685	0	0.0	N 74 W	1.43
1862	66.7	- 0.3	93.5	48.2	47.3	15	5.844	0	0.0	N 89 W	1.42
1863	67.6	+ 0.3	85.5	48.0	35.5	15	3.408	0	0.0	N 18 W	0.40
1864	69.7	+ 2.4	90.2	49.0	41.2	8	1.352	0	0.0	N 61 W	2.25
1865	65.0	- 2.3	83.0	45.8	37.2	11	2.470	0	0.0	N 86 W	2.28
1866	70.4	+ 3.1	94.0	47.4	46.2	16	5.399	0	0.0	N 79 W	1.94
1867	68.2	+ 8.5	93.4	48.2	45.8	12	1.965	0	0.0	N 48 W	1.40
1868	75.8	+ 8.5	93.4	59.0	34.4	6	0.510	0	0.0	N 87 E	0.72
1869	64.5	- 2.8	84.9	48.0	36.1	13	4.610	0	0.0	N 67 W	2.01
1870	68.2	+ 1.5	87.4	48.0	39.4	11	1.894	0	0.0	N 78 W	1.53
1871	66.0	- 1.3	88.4	47.8	40.6	11	1.255	0	0.0	N 85 W	1.55
7 months to 1871.	67.83	.....	89.16	46.76	42.40	10.65	8.313	0.00	0.00	N 76 W	0.74
1871.	1.36	.....	0.76	1.04	1.80	0.35	2.058	0.00	0.00	...	+ 0.71

NOTE.—The monthly means do not include Sunday observations. The daily means, excepting those that relate to the wind, were derived from six observations daily, namely at 5 A. M., 8 A. M., 11 A. M., 2 P. M., and 5 P. M. The means and resultants for the wind are from hourly observations.

Highest Barometer..... 29.842 at 8 a.m. on 24th. } Monthly range =  
 Lowest Barometer..... 29.225 at 4 p.m. on 18th. } 0.617 inches.  
 Maximum temperature..... 89° 4 on 9th. } Monthly range =  
 Minimum temperature..... 47.8 on 24th. } 40° 6  
 Mean maximum temperature..... 76° 13 } Mean daily range =  
 Mean minimum temperature..... 56° 07 } 28° 46  
 Greatest daily range..... 28° 6 from a.m. to p.m. of 18th.  
 Least daily range..... 10° 6 from a.m. to p.m. of 10th.  
 Warmest day..... 13th; mean temperature..... 75° 0  
 Coldest day..... 19th; mean temperature..... 57° 065 } Difference = 17° 86.  
 Maximum { Solar..... 105° 0 on 9th. } Monthly range =  
 Radiation { Terrestrial..... 37° 4 on 24th. } 67° 6  
 Aurora observed on 5 nights, viz.:—2nd, 14th, 19th, 20th, and 21st.  
 Possible to see Aurora on 25 nights; impossible on 6 nights.  
 Raining on 11 days; depth, 1.255 inches; duration of fall, 12.2 hours.  
 Mean of cloudiness = 0.47.

WIND.

Resulant direction, N. 88° W.; resultant velocity, 1.36.  
 Mean velocity, 5.67 miles per hour.  
 Maximum velocity, 24.9 miles, from 1.00 to 2.00 p.m. of 7th.  
 Most windy day, 7th; mean velocity, 11.10 miles per hour.  
 Second windy days, 2nd and 11th; mean velocity, 2.37 miles per hour  
 Least windy hour, 1 p.m.; mean velocity, 9.50 miles per hour.  
 Least windy hour, 2 a.m.; mean velocity, 3.60 miles per hour.

The rain fall will be seen from the comparative table to have been the least in any July, with the exception of 1853-6 and 1868.  
 Solar haloes recorded 8th and 10th  
 The dew was also less frequent, being only noticed on six mornings.

MONTHLY METEOROLOGICAL REGISTER, AT THE MAGNETICAL OBSERVATORY, TORONTO, ONTARIO, -AUGUST, 1871.  
 Latitude 43° 39' North. Longitude 76° 17' N. 33' West. Elevation above Lake Ontario, 108 feet.

Day	Barom. at temp. of 32°:			Temp. of the Air.			Excess of Mean above Normal.			Tension of Vapour.						Humidity of Air.						Direction of Wind.						Velocity of Wind.			Rain Inches.	Snow Inches.
	6 A.M.	10 P.M.	Mean.	6 A.M.	10 P.M.	Mean.	6 A.M.	10 P.M.	Mean.	6 A.M.	10 P.M.	Mean.	6 A.M.	10 P.M.	Mean.	6 A.M.	10 P.M.	Mean.	6 A.M.	10 P.M.	Mean.	6 A.M.	10 P.M.	Mean.	6 A.M.	10 P.M.	Mean.	6 A.M.	10 P.M.	Mean.		
1	29.620	29.621	29.620	60.5	71.8	66.1	2.08	484	482	482	465	92	83	74	N E	N E	N E	4.2	12.0	4.0	4.55	5.46	...	...								
2	29.683	29.683	29.683	60.8	72.9	66.8	2.12	404	490	511	491	79	42	74	N E	S E	S E	4.8	9.6	4.0	3.69	3.94	...	...								
3	29.641	29.641	29.641	60.9	80.7	72.0	4.82	389	653	657	676	72	49	84	Cal.	Cal.	Cal.	3.2	9.0	3.0	3.08	3.90	...	...								
4	29.681	29.681	29.681	60.9	80.7	72.0	4.82	389	653	657	676	72	49	84	N W	N W	N W	3.2	9.0	3.0	3.08	3.90	...	...								
5	29.680	29.680	29.680	61.0	79.3	70.1	2.16	416	273	362	343	66	24	63	N W	N W	N W	1.6	16.4	1.5	0.70	7.22	...	...								
6	29.686	29.686	29.686	61.0	79.3	70.1	2.16	416	273	362	343	66	24	63	N W	N W	N W	3.6	11.0	3.3	2.29	5.32	...	...								
7	29.636	29.636	29.636	63.4	79.2	71.3	4.48	445	590	638	548	75	50	83	Cal.	Cal.	Cal.	0.0	7.4	0.0	3.22	4.71	...	...								
8	29.628	29.628	29.628	63.4	79.2	71.3	4.48	445	590	638	548	75	50	83	N W	N W	N W	9.6	20.0	10.6	10.71	12.61	...	...								
9	29.663	29.663	29.663	61.2	75.3	68.4	0.22	386	408	393	420	71	53	57	N W	N W	N W	13.0	13.0	3.4	4.60	6.97	...	...								
10	29.705	29.705	29.705	64.0	76.0	70.0	1.03	316	360	448	379	83	41	75	N W	N W	N W	8.0	8.0	3.2	2.11	4.20	...	...								
11	29.630	29.630	29.630	64.0	76.0	70.0	1.03	316	360	448	379	83	41	75	N W	N W	N W	3.6	4.0	3.5	4.61	7.31	...	...								
12	29.722	29.722	29.722	60.8	63.8	62.3	2.71	425	674	617	528	85	59	73	N W	N W	N W	18.2	9.4	6.8	2.91	7.01	...	...								
13	29.705	29.705	29.705	60.8	63.8	62.3	2.71	425	674	617	528	85	59	73	N W	N W	N W	6.3	13.0	4.3	6.94	8.07	...	...								
14	29.665	29.665	29.665	61.6	75.7	68.6	2.83	393	634	382	462	71	60	60	N E	N E	N E	7.4	6.8	0.0	2.84	4.84	...	...								
15	29.697	29.697	29.697	61.6	75.7	68.6	2.83	393	634	382	462	71	60	60	N E	N E	N E	4.0	12.8	0.0	0.83	2.07	...	...								
16	29.741	29.741	29.741	63.5	68.1	65.8	4.03	656	636	338	491	97	60	50	66	N W	N W	N W	1.2	25.0	5.0	0.77	10.83	...	...							
17	29.781	29.781	29.781	60.4	73.6	67.0	1.35	375	412	349	372	74	60	65	62	N W	N W	N W	12.6	11.0	4.4	4.01	6.83	...	...							
18	29.752	29.752	29.752	64.4	72.6	69.5	1.22	256	240	330	293	60	28	60	N W	N W	N W	3.2	22.5	2.0	10.87	11.72	...	...								
19	29.677	29.677	29.677	62.9	72.6	67.8	2.83	318	222	368	309	78	27	67	55	N W	N W	N W	3.3	8.6	2.5	1.71	6.93	...	...							
20	29.677	29.677	29.677	62.9	72.6	67.8	2.83	318	222	368	309	78	27	67	55	N W	N W	N W	9.3	14.0	7.8	7.79	10.66	...	...							
21	29.677	29.677	29.677	64.7	72.2	68.7	5.22	355	442	380	404	84	73	78	N E	N E	N E	6.0	1.4	2.6	2.69	3.90	...	...								
22	29.785	29.785	29.785	60.0	74.8	67.4	2.62	392	687	619	651	70	73	84	60	N E	N E	N E	6.2	6.4	3.4	4.35	5.16	...	...							
23	29.807	29.807	29.807	66.3	78.9	72.6	7.15	589	628	618	614	92	64	86	70	N E	N E	N E	2.5	7.2	0.4	1.64	3.70	...	...							
24	29.698	29.698	29.698	63.4	80.7	72.0	5.47	420	425	862	423	72	40	63	49	N W	N W	N W	1.8	4.8	8.4	3.87	6.56	...	...							
25	29.753	29.753	29.753	60.8	72.4	66.6	1.57	262	368	297	334	72	49	63	49	N W	N W	N W	3.2	6.8	9.5	1.64	6.92	...	...							
26	29.638	29.638	29.638	60.4	62.7	61.5	2.63	307	491	487	447	60	75	80	81	N E	N E	N E	0.2	14.8	4.4	6.20	7.19	...	...							
27	29.638	29.638	29.638	60.4	62.7	61.5	2.63	307	491	487	447	60	75	80	81	N E	N E	N E	7.3	6.5	5.9	4.56	5.58	...	...							
28	29.656	29.656	29.656	65.8	76.4	71.1	4.00	344	611	577	481	77	80	78	80	N E	N E	N E	4.8	13.0	14.0	7.90	8.68	...	...							
29	29.717	29.717	29.717	67.1	69.2	68.1	0.68	628	693	630	589	92	82	84	60	N E	N E	N E	4.6	16.0	9.5	10.85	11.33	...	...							
30	29.708	29.708	29.708	63.0	70.5	66.7	1.33	487	249	327	398	85	47	67	67	N W	N W	N W	11.0	16.4	8.7	11.33	11.98	...	...							
31	29.483	29.483	29.483	63.6	63.4	63.5	5.26	340	288	287	304	83	49	67	65	N W	N W	N W	9.0	6.2	1.2	5.37	5.49	...	...							
29	29.634	29.634	29.634	60.81	74.46	67.37	1.41	428	470	450	458	78	66	72	68	N E	N E	N E	5.76	11.05	4.71	6.84	2.80	...	...							

REMARKS ON TORONTO METEOROLOGICAL REGISTER FOR AUGUST, 1871.

Notes - The monthly means do not include Sunday observations. The daily means, excepting those that relate to the wind, are derived from six observations daily, namely at 6 A.M., 8 A.M., 2 P.M., 4 P.M., 10 P.M., and midnight. The means and resultants of the wind are from hourly observations.

COMPARATIVE TABLE FOR AUGUST.

YEAR.	TEMPERATURE.				RAIN.		SNOW.		WIND.			
	Mean.	Excess above average.	Maxim. num.	Minim. num.	Range.	No. of days.	Inches.	No. of days.	Inches.	Resultant Direction.	Veloc'y.	Mean Velocity.
1843	66.4	+ 0.4	83.1	41.0	39.1	4	4.850	0	0.0	0	...	0.12 Ds
1844	64.3	- 1.7	84.8	43.5	43.3	17	Imp.	0	0.0	...	...	0.16
1845	67.9	+ 1.9	84.8	41.5	43.3	9	1.770	0	0.0	...	...	0.19
1846	68.4	+ 2.4	86.4	49.5	36.9	9	1.770	0	0.0	...	...	0.17
1847	65.1	- 0.9	82.6	44.6	38.0	10	2.140	0	0.0	...	...	0.19.
1848	69.2	+ 3.2	87.0	48.7	36.3	8	0.855	0	0.0	...	...	4.65mils
1849	66.3	+ 0.3	79.0	49.0	40.0	10	4.970	0	0.0	N 71 W	0.35	4.46
1850	66.8	+ 0.8	85.0	41.0	44.0	13	4.355	0	0.0	N 63 W	0.40	4.63
1851	63.6	- 2.4	79.8	42.0	37.8	10	2.695	0	0.0	N 70 E	0.66	3.30
1852	68.9	+ 0.1	81.2	45.8	35.4	9	2.575	0	0.0	S 36 E	0.30	4.28
1853	68.6	+ 2.6	94.9	42.5	52.4	11	2.575	0	0.0	N 64 W	1.76	4.60
1854	68.0	+ 2.0	99.2	45.6	53.6	6	0.455	0	0.0	N 63 W	1.04	6.97
1855	64.1	- 1.9	83.6	40.0	43.6	7	1.455	0	0.0	N 50 W	2.33	7.03
1856	63.6	- 2.4	82.7	41.5	41.2	13	1.680	0	0.0	S 77 W	1.51	6.36
1857	65.3	- 0.7	86.2	46.0	42.2	13	2.650	0	0.0	N 69 W	1.87	6.50
1858	67.6	+ 1.6	84.0	44.0	40.0	11	3.800	0	0.0	N 56 W	1.62	5.86
1859	66.0	+ 0.6	82.2	45.8	36.4	11	3.900	0	0.0	N 70 W	1.63	6.80
1860	64.6	- 1.6	87.0	46.8	40.2	14	3.405	0	0.0	N 8 E	0.46	4.21
1861	65.6	- 0.5	85.2	47.0	38.2	15	2.958	6	0.0	N 78 W	1.67	5.96
1862	67.6	+ 1.6	89.5	42.8	46.1	15	3.483	0	0.0	S 61 W	1.58	4.75
1863	66.0	+ 0.0	88.0	42.4	45.6	12	2.205	0	0.0	N 70 W	1.58	4.75
1864	68.6	+ 2.6	94.0	47.0	47.0	16	5.060	0	0.0	N 60 W	1.65	5.07
1865	65.2	- 0.8	87.8	44.4	43.4	8	1.990	0	0.0	N 59 W	2.58	5.18
1866	60.8	- 5.2	77.0	42.2	34.0	14	4.437	0	0.0	N 76 W	1.52	4.52
1867	68.1	+ 2.1	95.2	42.4	43.0	10	2.440	0	0.0	S 68 W	1.01	6.15
1868	67.2	+ 1.2	84.4	40.8	37.6	13	1.662	0	0.0	N 42 W	1.98	5.13
1869	63.6	- 2.4	89.0	43.5	45.5	11	4.273	0	0.0	N 75 W	1.80	5.92
1870	67.1	+ 1.1	84.0	40.0	44.0	14	3.422	0	0.0	N 52 W	1.99	6.86
1871	67.4	+ 1.4	89.5	46.0	43.5	8	2.800	0	0.0	N 57 W	1.10	6.21
Mean to 1870.	66.04	...	86.12	44.29	41.83	10.9	3.028	0	0.0	...	...	...
Excess for 71.	1.33	...	3.38	1.71	1.67	2.9	0.228	0	0.0	...	...	1.65

Highest Barometer ..... 29.847 at 12 p.m. on 12th } Monthly range =  
 Lowest Barometer ..... 29.141 at 4 p.m. on 23th } 0.706 inches.  
 { Maximum Temperature ..... 89.5 on 16th } Monthly range =  
 { Minimum Temperature ..... 46.0 on 19th } 43.5  
 { Mean Maximum Temperature ..... 77.40 } Mean daily range =  
 { Mean Minimum Temperature ..... 57.94 } 19.46  
 { Greatest daily range ..... 36.91 from p.m. of 16th to a.m. of 17th.  
 { Least daily range ..... 9.8 from a.m. of 20th to p.m. of 26th.  
 Warmest Day ..... 4th ... Mean Temperature ..... 79.13 } Difference = 18.98  
 Coldest Day ..... 31st ... Mean Temperature ..... 57.65 }  
 Radiation: { Terrestrial ..... 109.0 on 16th } Monthly range =  
 { ..... 86.0 on 19th } 70.0  
 Aurora observed on 4 nights, viz., 10th, 16th, 17th, and 24th.  
 Possible to see Aurora on 21 nights; impossible on 10 nights.  
 Raining on 8 days; depth 2.300 inches; duration of fall 29.6 hours.  
 Mean of Cloudiness = 0.51.

WIND.

Recurrent Direction N. 52° W.; Resultant Velocity 1.09.  
 Mean Velocity 6.86 miles per hour.  
 Maximum Velocity 25.0 miles, from 2 to 3 p.m. of 18th.  
 Most Windy day 8th; Mean Velocity 12.61 miles per hour.  
 Least Windy day 16th; Mean Velocity 2.67 miles per hour.  
 Most Windy hour 1 p.m.; Mean Velocity 10.68 miles per hour.  
 Least Windy hour Mid.; Mean Velocity 3.92 miles per hour.

Thunder with Lightning occurred on 4th, 8th, 15th, 20th, 23rd, 26th, and 23th.  
 Rainbow on the 30th.  
 Fog on 7th, 13th, 16th, 17th, and 23rd.  
 Dew on 1st, 2nd, 11th, 17th, 19th, and 23rd.  
 Shooting Stars numerous on the night of the 14th.

MONTHLY METEOROLOGICAL REGISTER, AT THE MAGNETICAL OBSERVATORY, TORONTO, ONTARIO, —SEPTEMBER, 1871.  
 Latitude—43° 39' 4" North. Longitude—5h. 17m. 33s. West. Elevation above Lake Ontario, 103 feet.

Day	Barom. at temp. of 32°.			Temp. of the Air.			Tension of Vapour.			Humidity of Air.			Direction of Wind.			Velocity of Wind.			Rain Inches.	Snow Inches.		
	0 A.M.	2 P.M.	10 P.M.	Mean.	0 A.M.	2 P.M.	10 P.M.	0 A.M.	2 P.M.	10 P.M.	0 A.M.	2 P.M.	10 P.M.	0 A.M.	2 P.M.	10 P.M.	0 A.M.	2 P.M.			10 P.M.	
	Mean.	0 A.M.	2 P.M.	10 P.M.	Mean.	0 A.M.	2 P.M.	10 P.M.	Mean.	0 A.M.	2 P.M.	10 P.M.	Mean.	0 A.M.	2 P.M.	10 P.M.	Mean.	0 A.M.			2 P.M.	10 P.M.
1	29.855	29.876	29.877	29.875	47.5	68.6	55.1	57.7	2.83	293	363	368	358	76	Calm.	Calm.	8 10 E	0.0	2.2	0.0	1.30	1.35
2	.912	.885	.842	.884	52.6	70.6	63.0	63.13	+ 0.88	354	399	413	391	68	Calm.	Calm.	8 19 E	0.0	11.5	0.8	3.35	3.53
3		.803			73.8									71	S E	S E	8 40 E	0.8	6.0	1.6	1.30	2.05
4	.751	.687	.612	.682	62.7	75.7	64.1	67.75	+ 0.10	544	653	650	678	80	S E	S E	8 26 E	0.0	6.8	0.0	1.57	1.81
5	.610	.576	.540	.572	62.3	80.7	65.9	70.68	+ 0.20	472	638	600	645	73	S W	S W	8 9 W	0.5	12.0	0.0	6.30	6.43
6	.457	.386	.607	.468	47.9	67.6	60.6	67.83	+ 0.78	661	550	271	463	60	N W	N W	8 18 W	4.8	14.0	14.2	8.41	10.43
7	.697	.767	.836	.743	47.9	64.6	63.3	65.93	+ 4.77	251	271	247	274	35	N E	N E	8 18 W	3.6	5.6	11.8	4.33	5.63
8	.931	.930	.852	.913	48.6	63.0	60.6	65.79	+ 2.38	230	294	372	296	67	N E	N E	8 70 E	3.2	11.5	5.6	6.14	7.37
9	.831	.830	.830	.831	52.6	73.1	65.2	65.07	+ 5.08	342	498	468	440	62	N E	N E	8 69 W	0.0	12.5	8.8	2.45	4.40
10					64.6									72	N E	N E	8 2 W	5.6	6.6	7.8	6.28	7.83
11	.029	.993	.987	.991	60.8	60.0	56.9	58.68	+ 0.52	283	353	286	318	70	N E	N E	8 2 W	6.3	2.6	8.8	1.16	4.43
12	.991	.926	.869	.923	61.8	67.4	65.1	68.42	+ 0.40	207	250	376	290	63	N E	N E	8 67 E	4.0	0.0	0.0	0.41	0.57
13	.816	.803	.923	.833	46.4	69.2	62.9	65.60	+ 2.92	269	234	174	212	61	N E	N E	8 25 W	0.0	16.5	3.4	6.81	6.89
14	.069	.031	.941	.094	39.2	61.1	61.6	64.84	+ 0.60	139	209	264	226	63	N E	N E	8 25 W	3.8	6.8	9.0	6.31	6.93
15	.788	.676	.667	.673	64.0	62.6	62.9	62.76	+ 4.87	335	353	371	344	80	N E	N E	8 76 E	7.6	9.5	1.2	4.39	7.28
16	.665	.662	.648	.656	62.2	60.9	67.6	67.02	+ 0.20	348	379	363	373	89	N W	N W	8 70 W	1.9	5.2	0.0	2.42	2.84
17		.794			52.9									66	N W	N W	8 44 W	3.8	26.0	0.0	10.16	10.42
18	.944	.793	.608	.722	37.4	63.3	63.6	69.53	+ 6.82	170	250	340	267	70	N E	N E	8 44 W	3.0	3.2	0.0	6.53	4.90
19	.401	.474	.019	.418	65.4	67.0	47.6	63.87	+ 2.07	118	330	216	314	68	N E	N E	8 49 W	0.0	17.0	10.2	7.71	8.21
20	.727	.780	.858	.807	38.3	49.6	40.8	42.70	+ 12.86	160	169	164	174	75	N W	N W	8 30 W	0.0	0.0	5.8	6.44	5.76
21	.859	.800	.854	.870	34.5	60.0	37.8	41.85	+ 13.27	138	212	191	179	61	N W	N W	8 33 E	3.2	3.0	0.0	0.81	2.00
22	.916	.762	.699	.741	37.4	59.4	47.6	50.87	+ 3.82	168	307	263	276	83	N E	N E	8 9 E	0.0	6.5	0.0	3.16	3.33
23	.455	.353	.365	.384	69.7	68.8	64.6	64.30	+ 10.03	408	462	467	450	65	N W	N W	8 76 W	2.7	21.0	11.0	6.77	7.19
24		.420			67.7									25	N W	N W	8 76 W	0.0	0.0	0.0	7.53	7.59
25	.685	.621	.489	.620	42.8	62.3	63.6	63.80	+ 0.38	240	236	351	287	87	N W	N W	8 82 W	0.0	7.2	4.0	2.13	3.00
26	.353	.338	.367	.348	47.5	61.8	43.9	47.93	+ 6.09	312	249	233	263	93	N W	N W	8 77 W	0.0	15.0	4.2	6.91	6.96
27	.353	.360	.337	.353	42.6	60.8	46.7	46.87	+ 5.73	244	330	268	273	89	N W	N W	8 60 W	3.6	5.8	0.0	5.84	6.68
28	.425	.630	.710	.571	39.9	49.7	42.8	44.28	+ 7.90	220	235	213	226	90	N W	N W	8 60 W	0.0	16.0	12.4	10.23	10.35
29	.825	.901	.952	.908	38.1	62.6	41.0	44.02	+ 7.73	179	192	210	196	77	N W	N W	8 65 W	4.5	15.0	0.8	5.90	6.05
30	.974	.942	.912	.939	38.8	58.7	46.8	48.40	+ 2.98	203	305	225	244	62	N W	N W	8 66 W	2.2	2.8	0.0	1.23	1.99
Mean	29.742	29.713	29.710	29.720	47.86	61.64	53.06	54.82	+ 2.43	289	334	317	317	81				2.76	9.68	4.05	6.50	1.290

REMARKS ON TORONTO METEOROLOGICAL REGISTER FOR SEPTEMBER, 1871.

NOTE.—The monthly means do not include Sunday observations. The daily means, excepting those that relate to the wind, are derived from six observations daily, namely, at 6 A.M., 8 A.M., 12 P.M., 4 P.M., 10 P.M., and midnight. The means and resultants of the wind are from hourly observations.

COMPARATIVE TABLE FOR SEPTEMBER.

Table with columns: YEAR, TEMPERATURE (Max. num., Min. num., Excess above average, Mean), RAIN (No. of days, Inches), SNOW (No. of days, Inches), WIND (Requiant, Direc. ton., Vlo., Mean velocity).

Highest Barometer ..... 30.090 at 10 a.m. on 14th. } Monthly range—
Lowest Barometer ..... 29.300 at 2 p.m. on 27th. } 0.790
Mean temperature ..... 51.0 on 5th. } Monthly range—
Minimum temperature ..... 31.0 on 21st. } 47.0
Maximum temperature ..... 64.0 on 21st. } 33.0
Mean maximum temperature ..... 64.833 } Mean daily range—
Mean minimum temperature ..... 49.930 } 17.063
Greatest daily range ..... 31.0° from p.m. of 13th to a.m. of 14th.
Least daily range ..... 6.4° from a.m. to p.m. of 16th.
Warmest day ..... 5th; mean temperature 70.689 } Difference—28.73
Coldest day ..... 21st; mean temperature 41.983 } 28.704
Radiation { Terrestrial ..... 92.4 on 6th. } Monthly range—
Aurora observed on 4 nights, viz.: 4th, 6th, 7th and 19th.
Possible to see aurora on 20 nights, impossible on 10 nights.
Raining on 8 days; depth, 1.280 inches; duration of fall, 27.7 hours.

WIND.

Requiant direction, N. 74° W.; resultant velocity, 1.72.
Mean velocity, 5.60 miles per hour.
Maximum velocity, 26.0 miles, from 1.30 p.m. to 2.30 p.m. of 17th.
Most windy day, 6th; mean velocity, 10.43 miles per hour.
Least windy day, 12th; mean velocity, 0.87 miles per hour.
Most windy hour, 1 p.m.; mean velocity, 9.55 miles per hour.
Least windy hour, 4 a.m.; mean velocity, 2.34 miles per hour.
Fog on 7th, 4th, 6th, 13th, 16th and 19th.
Fog on 12 occasions.
First Frost of Season on 18th.
Ice on 21st and 22nd.
Thunder on 3rd and 18th.
Lightning on 18th.

METEOROLOGICAL REGISTER.

MONTHLY METEOROLOGICAL REGISTER, AT THE MAGNETICAL OBSERVATORY, TORONTO, ONTARIO—OCTOBER, 1871  
 Latitude—43° 39' 4" North. Longitude—8h. 17m. 53s. West. Elevation above Lake Ontario, 108 feet.

Day	Barom. at temp. of 32°.			Temp. of the Air.			Tension of Vapour.			Humidity of Air.			Direction of Wind.			Velocity of Wind.			Rain Inches.	Snow Inches.
	6 A.M.	10 P.M.	Mean.	6 A.M.	10 P.M.	Mean.	6 A.M.	10 P.M.	Mean.	6 A.M.	10 P.M.	Mean.	6 A.M.	10 P.M.	Mean.	6 P.M.	10 P.M.	Mean.		
1	29.789	29.789	29.789	63.2	63.2	63.2	2.97	48	76	Cal.	SSW	SSW	83 W	0.0	10.3	3.46	3.46	3.46	0.0	0.0
2	29.789	29.789	29.789	65.0	65.0	65.0	5.70	90	80	Cal.	SSW	SSW	83 W	0.0	10.3	3.46	3.46	3.46	0.0	0.0
3	29.789	29.789	29.789	65.0	65.0	65.0	5.70	90	80	Cal.	SSW	SSW	83 W	0.0	10.3	3.46	3.46	3.46	0.0	0.0
4	29.789	29.789	29.789	65.0	65.0	65.0	5.70	90	80	Cal.	SSW	SSW	83 W	0.0	10.3	3.46	3.46	3.46	0.0	0.0
5	29.789	29.789	29.789	65.0	65.0	65.0	5.70	90	80	Cal.	SSW	SSW	83 W	0.0	10.3	3.46	3.46	3.46	0.0	0.0
6	29.789	29.789	29.789	65.0	65.0	65.0	5.70	90	80	Cal.	SSW	SSW	83 W	0.0	10.3	3.46	3.46	3.46	0.0	0.0
7	29.789	29.789	29.789	65.0	65.0	65.0	5.70	90	80	Cal.	SSW	SSW	83 W	0.0	10.3	3.46	3.46	3.46	0.0	0.0
8	29.789	29.789	29.789	65.0	65.0	65.0	5.70	90	80	Cal.	SSW	SSW	83 W	0.0	10.3	3.46	3.46	3.46	0.0	0.0
9	29.789	29.789	29.789	65.0	65.0	65.0	5.70	90	80	Cal.	SSW	SSW	83 W	0.0	10.3	3.46	3.46	3.46	0.0	0.0
10	29.789	29.789	29.789	65.0	65.0	65.0	5.70	90	80	Cal.	SSW	SSW	83 W	0.0	10.3	3.46	3.46	3.46	0.0	0.0
11	29.789	29.789	29.789	65.0	65.0	65.0	5.70	90	80	Cal.	SSW	SSW	83 W	0.0	10.3	3.46	3.46	3.46	0.0	0.0
12	29.789	29.789	29.789	65.0	65.0	65.0	5.70	90	80	Cal.	SSW	SSW	83 W	0.0	10.3	3.46	3.46	3.46	0.0	0.0
13	29.789	29.789	29.789	65.0	65.0	65.0	5.70	90	80	Cal.	SSW	SSW	83 W	0.0	10.3	3.46	3.46	3.46	0.0	0.0
14	29.789	29.789	29.789	65.0	65.0	65.0	5.70	90	80	Cal.	SSW	SSW	83 W	0.0	10.3	3.46	3.46	3.46	0.0	0.0
15	29.789	29.789	29.789	65.0	65.0	65.0	5.70	90	80	Cal.	SSW	SSW	83 W	0.0	10.3	3.46	3.46	3.46	0.0	0.0
16	29.789	29.789	29.789	65.0	65.0	65.0	5.70	90	80	Cal.	SSW	SSW	83 W	0.0	10.3	3.46	3.46	3.46	0.0	0.0
17	29.789	29.789	29.789	65.0	65.0	65.0	5.70	90	80	Cal.	SSW	SSW	83 W	0.0	10.3	3.46	3.46	3.46	0.0	0.0
18	29.789	29.789	29.789	65.0	65.0	65.0	5.70	90	80	Cal.	SSW	SSW	83 W	0.0	10.3	3.46	3.46	3.46	0.0	0.0
19	29.789	29.789	29.789	65.0	65.0	65.0	5.70	90	80	Cal.	SSW	SSW	83 W	0.0	10.3	3.46	3.46	3.46	0.0	0.0
20	29.789	29.789	29.789	65.0	65.0	65.0	5.70	90	80	Cal.	SSW	SSW	83 W	0.0	10.3	3.46	3.46	3.46	0.0	0.0
21	29.789	29.789	29.789	65.0	65.0	65.0	5.70	90	80	Cal.	SSW	SSW	83 W	0.0	10.3	3.46	3.46	3.46	0.0	0.0
22	29.789	29.789	29.789	65.0	65.0	65.0	5.70	90	80	Cal.	SSW	SSW	83 W	0.0	10.3	3.46	3.46	3.46	0.0	0.0
23	29.789	29.789	29.789	65.0	65.0	65.0	5.70	90	80	Cal.	SSW	SSW	83 W	0.0	10.3	3.46	3.46	3.46	0.0	0.0
24	29.789	29.789	29.789	65.0	65.0	65.0	5.70	90	80	Cal.	SSW	SSW	83 W	0.0	10.3	3.46	3.46	3.46	0.0	0.0
25	29.789	29.789	29.789	65.0	65.0	65.0	5.70	90	80	Cal.	SSW	SSW	83 W	0.0	10.3	3.46	3.46	3.46	0.0	0.0
26	29.789	29.789	29.789	65.0	65.0	65.0	5.70	90	80	Cal.	SSW	SSW	83 W	0.0	10.3	3.46	3.46	3.46	0.0	0.0
27	29.789	29.789	29.789	65.0	65.0	65.0	5.70	90	80	Cal.	SSW	SSW	83 W	0.0	10.3	3.46	3.46	3.46	0.0	0.0
28	29.789	29.789	29.789	65.0	65.0	65.0	5.70	90	80	Cal.	SSW	SSW	83 W	0.0	10.3	3.46	3.46	3.46	0.0	0.0
29	29.789	29.789	29.789	65.0	65.0	65.0	5.70	90	80	Cal.	SSW	SSW	83 W	0.0	10.3	3.46	3.46	3.46	0.0	0.0
30	29.789	29.789	29.789	65.0	65.0	65.0	5.70	90	80	Cal.	SSW	SSW	83 W	0.0	10.3	3.46	3.46	3.46	0.0	0.0
31	29.789	29.789	29.789	65.0	65.0	65.0	5.70	90	80	Cal.	SSW	SSW	83 W	0.0	10.3	3.46	3.46	3.46	0.0	0.0
Mean	29.789	29.789	29.789	65.0	65.0	65.0	5.70	90	80	Cal.	SSW	SSW	83 W	0.0	10.3	3.46	3.46	3.46	0.0	0.0
Max	29.789	29.789	29.789	65.0	65.0	65.0	5.70	90	80	Cal.	SSW	SSW	83 W	0.0	10.3	3.46	3.46	3.46	0.0	0.0
Min	29.789	29.789	29.789	65.0	65.0	65.0	5.70	90	80	Cal.	SSW	SSW	83 W	0.0	10.3	3.46	3.46	3.46	0.0	0.0

REMARKS ON TORONTO METEOROLOGICAL REGISTER FOR OCTOBER, 1871. COMPARATIVE TABLE FOR OCTOBER.

Note.—The monthly means do not include Sunday observations. The daily means, excepting those that relate to the wind, are derived from six observations daily, namely at 6 A.M., 8 A.M., 2 P.M., 4 P.M., 10 P.M., and midnight. The means and resultants for the wind are from hourly observations.

Highest Barometer.....30.042 at 8 a.m. on 13th. } Monthly range =  
 Lowest Barometer.....29.163 at midnight on 3rd. } 0.879.  
 { Minimum Temperature.....72°2 on 22nd. } Monthly range =  
 { Maximum Temperature.....28°3 on 31st. } 43.6.  
 Mean Maximum Temperature.....48°28. } Mean daily range =  
 Mean Minimum Temperature.....40°76. } 17°80.  
 { Greatest daily range.....30°83 from p.m. of 18th to p.m. of 19th.  
 { Least daily range.....8°3 from a.m. to p.m. of 6th.  
 Warmest day.....6th.....Mean Temperature.....56°72. } Difference = 18°10.  
 Coldest day.....20th.....Mean Temperature.....38°02. }  
 Maximum { Solar .....82°2 on 22nd. } Monthly range =  
 Radiation. { Torrestrial .....19°8 on 7th. } 62°4.  
 Aurora observed on 3 nights, viz.: 6th, 16th, and 17th.  
 Possible to see Aurora on 16 nights; impossible on 16 nights.  
 Raining on 12 days; depth 1.185 inches; duration of fall 30.2 hours.  
 Mean of Cloudiness, 0.68.

WIND.

Resultant Direction S. 66° W.; Resultant Velocity 3.75 miles.  
 Mean Velocity 7.84 miles per hour.  
 Maximum Velocity 36.0 miles, from 8 to 9 a.m. of 16th.  
 Most Windy day 10th; Mean Velocity 17.41 miles per hour.  
 Least Windy day 7th; Mean Velocity 2.42 miles per hour.  
 Most Windy hour 2 p.m.; Mean Velocity 12.73 miles per hour.  
 Least Windy hour 1 a.m.; Mean Velocity 4.40 miles per hour.

Fog recorded on 9 occasions during month.

Solar halo, 9th; Lunar halo on 24th and 30th.

Thunder storms on 5th and 26th; Rainbows on 1st and 18th.

21st, Large Meteor in W. at 8.30 p.m., colour bright blue.

Particles of Snow are reported to have fallen on the afternoon of the 17th, in the University Grounds.

YEAR.	TEMPERATURE.				RAIN.		SNOW.		WIND.		
	Mean	Excess above average	Max. num.	Min. num.	Range	No of days.	Inches.	No of days.	Inches.	Resultant.	Mean Velocity.
1843	41.8	-4.0	63.0	24.2	43.8	12	3.796	4	2.5	0	0.54 lbs
1844	43.3	-2.5	71.6	15.9	55.7	7	Imp.	4	12.0	0	0.43
1845	40.4	+0.6	64.0	20.1	49.3	11	1.766	2	Imp.	0	0.28
1846	44.6	+1.2	70.1	20.1	49.4	14	4.186	2	Imp.	0	0.44
1847	44.0	+1.8	64.8	20.4	44.2	13	4.890	2	Imp.	0	0.19
1848	46.3	+0.6	61.8	24.5	37.3	11	1.650	1	Imp.	N 54 W	1.24
1849	45.3	+0.4	68.9	22.4	34.7	13	5.965	1	Imp.	N 12 W	1.27
1850	25.4	-0.4	66.7	22.4	44.3	10	2.088	2	0.3	N 66 W	1.10
1851	47.4	+1.6	66.2	23.2	41.0	10	1.680	2	0.3	S 72 W	1.08
1852	48.0	+2.2	70.7	23.8	46.9	12	5.280	2	Imp.	N 5 E	1.19
1853	44.4	+1.4	64.7	23.4	41.3	10	4.876	2	Imp.	S 88 W	1.74
1854	43.6	+3.7	75.4	26.4	49.0	15	1.495	3	Imp.	N 45 W	1.52
1855	46.4	+0.4	68.0	22.6	45.4	14	2.485	5	0.8	N 82 W	4.91
1856	45.3	-0.5	71.4	23.0	48.4	10	5.515	2	0.1	N 76 W	2.15
1857	45.4	+0.4	64.0	26.5	37.5	10	1.040	2	0.2	N 19 W	2.93
1858	48.8	+3.0	76.3	31.5	44.8	17	1.797	2	Imp.	N 34 W	0.32
1859	43.0	-2.8	69.8	22.3	47.6	11	9.40	4	Imp.	N 68 W	5.04
1860	47.3	+1.6	68.0	28.4	39.6	15	1.615	1	Imp.	N 9 W	2.00
1861	48.7	+2.9	71.0	29.0	42.0	16	1.943	1	Imp.	N 61 W	1.08
1862	48.7	+2.9	76.6	26.2	50.4	19	2.684	2	0.5	N 78 W	2.88
1863	45.9	+0.1	66.4	30.5	35.9	16	2.622	1	Imp.	S 71 W	2.49
1864	45.2	-0.6	67.0	28.0	39.0	22	3.321	3	Imp.	N 60 W	3.17
1865	44.6	-1.3	71.4	21.6	49.8	17	2.705	3	4.5	N 36 W	3.55
1866	49.1	+3.3	71.0	31.8	39.2	11	2.470	1	Imp.	N 30 W	0.81
1867	49.9	+4.1	75.4	21.0	44.4	11	1.970	2	2.0	N 45 W	1.51
1868	42.4	-3.4	67.6	21.0	43.6	10	1.364	8	2.3	N 89 W	1.27
1869	42.3	-3.5	69.8	18.7	51.1	8	9.962	7	2.3	N 89 W	3.72
1870	50.0	+4.2	68.5	30.2	38.8	16	2.690	7	2.3	N 55 W	1.86
1871	48.3	+2.6	72.2	28.6	43.6	13	1.184	...	...	S 66 W	3.75
Resultant to 1870.	46.78	...	68.75	24.86	43.89	12.48	2.429	1.87	0.90	N 60 W	1.80
Excess for '71	2.50	...	3.45	3.74	0.29	0.52	1.244	1.87	0.90	...	1.72





REMARKS ON TORONTO METEOROLOGICAL REGISTER FOR NOVEMBER, 1871

NOTE.—The monthly means do not include Sunday observations. The daily means, excepting those that relate to the wind, are derived from six observations daily, namely at 6 A.M., 8 A.M., 2 P.M., 4 P.M., 10 P.M., and midnight. The means and resultants of the wind are from hourly observations.

Highest Barometer ..... 30.315 at 8 a.m. on 12th. } Monthly range= 1.303  
 Lowest Barometer ..... 29.012 at mid. on 14th. }  
 State of sky ..... 47° 1 on 1st. } Monthly range= 47° 1  
 { Minimum temperature ..... 0.0 on 30th. }  
 { Mean maximum temperature ..... 36.97 } Mean daily range= 10.83  
 { Mean minimum temperature ..... 26.12 }  
 { Greatest daily range ..... 20% from a.m. to p.m. of 7th.  
 { Least daily range ..... 4% from a.m. to p.m. of 21st.  
 Warmest day ..... 1st; mean temperature 41° 12 } Difference= 32.17  
 Golden day ..... 28th; mean temperature 8° 5 }  
 Radiation { Terrestrial ..... 6° 20 on 2nd. } Monthly range= 71° 0  
 { Aurora observed on 5 nights, viz.: 2nd, 3rd, 9th, 11th and 21st.  
 Possible to see aurora on 11 nights; impossible on 19 nights.  
 Snowing on 12 days; depth 4.5 inches; duration of fall 41.7 hours.  
 Raining on 10 days; depth, 2.655 inches; duration of fall, 40.5 hours.

WIND.

Resultant direction, N. 49° W.; Resultant velocity, 4.08.  
 Mean velocity, 10.35 miles per hour.  
 Maximum velocity, 37.0 miles, from 3 to 4 p.m. of 15th.  
 Most windy day, 15th; mean velocity, 52.10 miles per hour.  
 Least windy day, 3rd; mean velocity, 2.67 miles per hour.  
 Most windy hour, noon; mean velocity, 13.49 miles per hour.  
 Least windy hour, 2 a.m.; mean velocity, 8.14 miles per hour.

Solar haloes on 6th and 13th. Lunar halo on 23rd.

During the early part of the month barometer fluctuating very considerably.

This month is the coldest November yet recorded, the mean being 6.1 below the average;

the mean of each of the last three days being colder than any day in a similar month.

The velocity of the wind on the 16th is the greatest daily velocity ever recorded at the Observatory.

COMPARATIVE TABLE FOR NOVEMBER.

YEAR.	TEMPERATURE.				RAIN.		SNOW.		WIND.		
	Mean.	Excess above Average.	Maxi- mum.	Mini- mum.	Range.	No. of days.	Inches.	No. of days.	Inches.	Resultant Direc- tion.	Mean Velocity.
1843	33.5	- 5.2	52.0	13.1	39.5	10	4.765	7	1.2	0	0.59 lbs
1844	34.9	- 1.8	60.0	12.1	43.9	8	Imp.	4	8.0	0	0.48
1845	36.8	+ 0.1	59.5	8.1	51.4	7	1.105	4	5.0	0	0.53
1846	41.3	+ 4.0	55.8	18.0	37.6	12	5.803	2	0.4	0	0.84
1847	38.0	+ 1.9	57.9	8.7	49.2	14	13.166	3	Imp.	0	0.36
1848	34.5	- 2.2	49.0	15.9	33.1	9	12.020	3	1.4	N 81 W	1.51
1849	42.6	+ 5.9	66.4	26.6	29.0	10	12.816	2	1.0	N 30 W	1.53
1850	38.8	+ 2.1	62.8	11.0	51.8	7	2.955	1	Imp.	N 42 W	1.43
1851	32.0	- 3.8	60.2	13.8	36.4	5	3.885	6	6.7	N 60 W	1.25
1852	35.0	- 0.7	50.4	18.2	32.2	7	1.775	3	2.0	N 65 W	1.63
1853	33.7	+ 2.0	55.3	12.8	42.8	15	12.425	3	2.7	N 9 W	0.55
1854	36.8	+ 0.1	55.4	13.8	41.6	13	1.115	4	1.3	West.	3.44
1855	38.6	+ 1.9	59.2	16.6	43.7	8	4.690	6	3.0	N 66 W	3.18
1856	37.4	+ 0.7	56.4	18.3	37.6	10	1.375	9	9.5	N 85 W	2.05
1857	33.5	- 3.2	58.2	3.5	61.7	14	3.235	0	6.0	N 61 W	5.45
1858	34.2	- 2.5	63.0	13.3	37.7	12	3.979	13	4.0	N 23 W	3.14
1859	38.0	+ 2.2	62.0	18.3	40.8	12	6.183	9	0.6	N 81 W	3.39
1860	37.9	+ 1.2	64.5	21.8	31.3	12	2.669	8	1.9	N 89 W	4.75
1861	37.1	+ 0.4	62.4	23.0	29.4	14	4.294	8	3.2	N 46 W	1.94
1862	35.6	- 1.1	58.0	16.2	41.8	11	2.205	11	6.3	N 48 W	3.00
1863	39.1	+ 2.4	67.0	17.8	49.2	13	3.656	6	0.1	N 88 W	3.40
1864	35.0	+ 0.2	63.2	21.0	39.2	11	3.765	8	4.5	N 72 W	3.82
1865	38.6	+ 1.9	63.2	23.6	39.6	5	0.976	7	1.1	N 78 W	2.98
1866	38.4	+ 1.7	64.2	21.8	32.4	13	2.963	13	2.2	N 88 W	3.08
1867	36.9	+ 0.2	60.4	9.6	50.8	8	1.835	9	0.9	N 87 W	4.02
1868	36.2	- 0.5	60.6	20.1	30.4	14	5.160	10	4.3	N 35 W	2.10
1869	32.7	- 4.0	68.0	13.0	45.0	9	2.540	18	10.2	N 78 W	3.69
1870	35.6	- 0.1	57.2	19.4	37.8	6	0.594	6	3.1	N 89 W	3.86
1871	30.9	- 6.1	47.1	0.0	47.1	10	2.665	12	4.5	N 45 W	4.03
Results to 1871	39.72	.....	57.01	15.70	41.31	10.03	2.987	6.71	3.23	N 78 W	2.65
Excess for '71.	6.12	.....	9.91	15.70	5.76	0.03	0.332	5.29	1.27	.....	2.76



REMARKS ON TORONTO METEOROLOGICAL REGISTER FOR DECEMBER, 1871. COMPARATIVE TABLE FOR DECEMBER.

Note.—The monthly means do not include Sunday observations. The daily means, excepting those that relate to the wind, are derived from six observations daily, namely at 6 A.M., 8 A.M., 2 P.M., 4 P.M., 10 P.M., and midnight. The means and resultants of the wind are from hourly observations.

YEAR.	TEMPERATURE.				RAIN.		SNOW.		WIND.		
	Mean.	Excess above average.	Maxim. num.	Minim. num.	Range.	No. of days.	Inches.	No. of days.	Inches.	Resultant Direction.	Mean Velocity.
1843	30.0	+ 4.0	48.6	3.1	46.4	6	1.046	8	8.1	0	...
1844	28.2	+ 2.2	48.6	1.6	46.9	2	Imp.	6	4.2	...	0.40
1846	27.1	+ 1.0	39.7	2.4	42.1	2	Imp.	12	4.7	...	0.70
1840	27.6	+ 1.6	49.2	3.9	45.3	5	1.185	0	6.8	...	0.67
1847	30.1	+ 4.1	49.8	0.3	49.3	7	2.766	7	16.6	...	1.12
1848	29.1	+ 3.1	48.8	1.1	47.3	6	2.016	12	20.6	...	2.66
1849	20.6	+ 0.6	40.8	6.6	47.8	6	0.106	18	20.6	...	2.93
1850	21.7	+ 4.8	48.8	0.0	47.8	7	0.106	16	10.7	...	4.00
1851	21.6	+ 4.6	44.0	14.8	58.8	0	3.995	10	20.1	...	1.08
1852	21.9	+ 4.9	51.0	13.2	37.8	4	0.623	13	22.3	...	2.39
1853	25.13	+ 0.7	46.4	8.4	54.8	4	0.694	12	17.2	...	2.59
1854	21.9	+ 4.1	44.8	7.0	51.8	6	0.694	12	17.2	...	2.59
1856	20.8	+ 0.8	47.0	6.2	52.2	6	1.846	10	20.5	...	6.02
1856	21.9	+ 3.1	42.2	9.1	51.3	6	1.700	20	16.3	...	8.87
1857	31.9	+ 6.9	46.0	-7.1	41.2	11	3.203	14	9.0	...	2.66
1858	27.1	+ 1.4	46.4	4.2	41.2	11	1.637	18	10.4	...	1.66
1858	17.3	+ 8.1	58.8	0.0	60.8	3	1.035	23	37.4	...	4.29
1859	24.0	+ 2.0	39.0	7.0	46.0	3	1.362	21	13.6	...	4.66
1861	31.1	+ 6.2	58.2	5.5	49.7	6	0.600	8	6.8	...	3.17
1862	29.8	+ 2.8	50.1	3.4	53.6	5	1.942	8	10.4	...	3.17
1863	27.0	+ 1.6	53.4	1.6	51.9	10	2.004	17	7.1	...	1.61
1864	24.7	+ 1.3	50.4	10.4	60.9	9	2.046	18	27.1	...	8.82
1865	27.1	+ 1.7	51.2	6.7	48.6	7	1.727	11	6.2	...	3.07
1866	25.1	+ 0.9	51.0	5.0	50.0	7	2.706	13	15.5	...	4.98
1867	21.0	+ 4.4	49.5	12.8	62.3	7	1.408	21	13.6	...	4.82
1868	22.6	+ 3.6	44.2	3.2	47.4	1	0.003	18	15.6	...	8.81
1869	28.7	+ 2.7	46.0	6.0	39.0	10	2.690	16	7.1	...	2.31
1870	20.6	+ 0.6	45.2	6.8	51.6	0	2.436	16	16.9	...	6.04
1871	19.9	+ 6.1	48.2	-21.0	69.2	4	0.940	20	14.2	...	6.91
Results for 1870.	26.04	...	47.00	-2.43	60.03	6.77	1.678	13.39	14.14	N 77 W	3.13
Excess for 71.	6.14	...	0.60	18.57	19.17	1.77	0.738	6.61	0.06	...	2.88

Highest Barometer..... 30.07 at 8 a.m. on 28th. } Monthly range==  
 Lowest Barometer..... 28.970 at 4 p.m. on 23rd. } 1.051.  
 Maximum Temperature..... 58.2 on 23rd. } Monthly range==  
 Minimum Temperature..... -2.69 on 21st } 69.2.  
 Mean Maximum Temperature..... 29.63. } Mean daily range==  
 Mean Minimum Temperature..... 14.90. } 14.73.  
 Greatest daily range..... 31.83 from a.m. to p.m. of 23rd.  
 Least daily range..... 4.93 from a.m. to p.m. of 19th.  
 Warmest day..... 23rd... Mean Temperature..... 37.63. }  
 Coldest day..... 20th... Mean Temperature..... - 3.80 } Difference==41.43.  
 Maximum { Solar ..... 64.98 on 17th. }  
 Radiation { Terrestrial ..... 27.98 on 21st. } Difference==82.96.  
 Aurora observed on 2 nights, viz.: 8th and 14th.  
 Possible to see Aurora on 13 nights; impossible on 16 nights.  
 Snowing on 20 days; depth 14.2 inches; duration of fall 102.1 hours.  
 Hailing on 4 days; depth 0.946 inches; duration of fall 23.8 hours.  
 Mean of Cloudiness, 0.81.

WIND.  
 Resultant Direction S. 70° W.; Resultant Velocity 6.91 miles.  
 Mean Velocity 11.62 miles per hour.  
 Maximum Velocity 45.0 miles; from 11 a.m. to noon on 20th.  
 Most Windy day 27th; Mean Velocity 21.71 miles per hour.  
 Least Windy day 20th; Mean Velocity 3.73 miles per hour.  
 Most Windy hour 2 p.m.; Mean Velocity 13.92 miles per hour.  
 Least Windy hour 7 a.m.; Mean Velocity 9.07 miles per hour.

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GENERAL METEOROLOGICAL REGISTER

FOR THE YEAR 1871.

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## GENERAL METEOROLOGICAL

MAGNETICAL OBSERVATORY,

Latitude 43° 39' 4" North. Longitude 5h. 17m. 33s. West. Elevation above

	JAN.	FEB.	MAR.	APR.	MAY.	JUNE.	JULY.
Mean temperature .....	21.34	24.33	31.65	42.95	54.15	61.39	65.98
Difference from average (31 years) ...	-1.80	+1.30	+6.13	+1.88	+2.60	-0.23	-1.35
Thermic anomaly (lat. 43° 40') .....	-11.46	-10.37	-5.46	-7.05	-3.95	-3.21	-2.72
Highest temperature .....	46.4	48.0	58.5	72.8	85.0	83.0	88.4
Lowest temperature .....	-13.2	-15.8	17.0	26.4	32.4	41.2	47.8
Monthly and annual ranges .....	59.6	63.8	41.5	46.4	52.6	41.8	40.6
Mean maximum temperature .....	28.41	30.36	41.42	52.81	63.67	71.47	76.13
Mean minimum temperature .....	13.41	17.03	23.89	35.57	43.93	52.17	55.67
Mean daily range .....	15.00	13.33	12.23	17.24	19.74	19.30	20.46
Greatest daily range .....	34.6	27.0	21.5	31.3	32.2	29.6	23.6
Mean height of the Barometer .....	29.7590	29.6311	29.5635	29.4584	29.6185	29.5431	29.5552
Difference from average (30 years) ...	+1.1173	+0.0652	-0.0326	-1.1362	+0.0501	-0.0320	-0.0406
Highest barometer .....	30.338	30.119	29.999	30.116	29.952	29.975	29.842
Lowest barometer .....	29.048	28.673	29.074	29.014	29.265	29.039	29.225
Monthly and annual ranges .....	1.340	1.446	0.895	1.102	0.687	0.758	0.617
Mean humidity of the air .....	84	77	76	69	63	69	72
Mean elasticity of aqueous vapour .....	0.110	0.109	0.154	0.194	0.283	0.382	0.422
Mean of cloudiness .....	0.60	0.71	0.70	0.71	0.48	0.46	0.47
Difference from average (18 years) ...	+0.08	-0.01	+0.08	+0.11	-0.08	-0.07	-0.03
Resultant direction of the wind .....	N. 49 W.	N. 70 W.	N. 31 W.	N. 48 W.	N. 23 W.	N. 80 W.	N. 88 W.
“ velocity of the wind .....	2.56	4.26	2.59	1.66	2.53	2.04	1.55
Mean velocity (miles per hour) .....	9.34	9.67	8.31	8.85	7.70	6.67	5.67
Difference from average (23 years) ...	+1.62	+1.29	-0.62	+0.75	+1.00	+1.42	+0.71
Total amount of rain .....	0.864	0.040	2.782	3.318	2.302	3.340	1.255
Difference from average (31 years) ...	-0.376	-0.883	+1.537	+0.908	-0.983	+0.374	-2.058
Number of days of rain .....	8	3	8	17	7	13	11
Total amount of snow .....	43.6	23.0	18.0	1.3	...	...	...
Difference from average (28 years) ...	+27.67	+3.83	+0.81	-1.13	-0.07	...	...
Number of days of snow .....	23	15	12	2	...	...	...
Number of fair days .....	5	11	14	13	24	17	20
Number of auroras observed .....	3	4	5	6	9	5	5
Possible to see aurora (No. of nights) ...	9	12	16	19	24	24	25
Number of thunder storms .....	0	0	1	2	1	3	6

## REGISTER FOR THE YEAR 1871.

TORONTO, ONTARIO.

Lake Ontario, 108 feet. Approximate elevation above the Sea, 342 feet.

AUG.	SEPT.	OCT.	NOV.	DEC.	1871.	1870.	1869.	1868.	1867.	1866.	1865.
67.37 + 1.33 - 1.13	54.32 - 3.33 - 6.68	49.28 + 2.50 - 5.62	30.60 - 6.12 - 12.60	19.90 - 6.14 - 16.10	43.61 - 0.35 - 7.19	45.93 + 1.77 - 5.07	43.13 - 1.03 - 7.57	43.33 - 0.83 - 7.67	43.84 - 0.32 - 7.16	43.51 - 0.65 - 7.49	44.92 + 0.76 - 6.08
89.6 46.0 43.5	81.8 34.0 47.8	72.2 28.6 43.0	47.1 0.0 47.1	48.2 - 21.0 69.2	59.5 - 21.0 110.5	68.4 - 6.6 95.0	89.0 - 5.4 94.4	93.4 - 15.6 109.0	95.2 - 12.6 109.0	94.0 - 14.0 108.0	90.5 - 10.0 100.5
77.40 57.94 19.46 28.5	64.53 46.90 17.63 27.0	58.26 40.76 17.50 30.8	36.97 26.12 10.85 20.8	29.63 14.90 14.73 34.3	...	...	...	...	...	...	...
29.5780 -0.0450	29.7200 +0.0514	29.6329 -0.0161	29.6307 +0.0294	29.5734 -0.0783	29.6066 -0.0105	29.5958 -0.0215	29.5870 -0.0201	29.6421 +0.0250	29.6140 -0.0031	29.6216 +0.0045	29.6830 +0.0159
29.847 29.141 0.706	30.090 29.300 0.790	30.042 29.163 0.879	30.316 29.012 1.303	30.027 28.976 1.051	30.388 28.673 1.715	30.212 28.166 2.046	30.223 28.793 1.430	30.445 28.824 1.621	30.332 28.708 1.664	30.940 28.807 2.133	30.354 28.707 1.647
68	71	72	76	80	73	76	77	76	74	75	75
0.459	0.317	0.250	0.136	0.094	0.242	0.279	0.252	0.264	0.252	0.248	0.239
0.51 + 0.03	0.56 + 0.07	0.68 + 0.07	0.77 + 0.03	0.81 + 0.06	0.64 + 0.03	0.62 + 0.01	0.66 + 0.05	0.64 + 0.03	0.61 0.00	0.61 0.00	0.61 0.00
N. 52 W. 1.09 6.86 + 1.65	N. 74 W. 1.72 5.50 + 0.07	E. 66 W. 3.75 7.84 + 1.72	N. 40 W. 4.08 10.35 + 2.76	S. 70 W. 6.91 11.52 + 2.88	N. 72 W. 2.49 8.24 + 1.28	N. 45 W. 1.61 7.33 + 0.37	N. 64 W. 2.65 7.20 + 0.24	N. 57 W. 1.47 7.69 + 0.73	N. 60 W. 2.05 7.00 + 0.04	N. 73 W. 2.83 7.41 + 0.45	N. 68 W. 1.98 6.78 - 0.18
2.500 -0.229 8	1.290 -2.507 8	1.185 -1.244 13	2.655 -0.332 10	0.940 -0.738 4	22.771 -6.531 110	33.598 +4.596 116	31.182 +1.880 115	29.408 +1.106 103	10.041 -10.261 100	34.209 +4.907 126	26.599 -2.703 111
...	...	...	4.6 + 1.27	14.2 + 0.06	99.6 +31.54	122.9 +54.84	84.6 +16.54	78.7 +10.64	110.5 +42.44	52.1 -15.96	63.3 - 4.78
...	...	...	12	20	84	77	81	82	84	69	68
21	22	18	15	7	157	185	180	190	161	180	201
4	4	3	5	2	53	77	47	50	43	44	55
21	20	15	11	13	209	206	182	193	202	209	201
6	0	2	0	1	22	34	32	25	23	24	17

## MEAN METEOROLOGICAL RESULTS

## TEMPERATURE.

	1871.	Average of 31 years.	Extremes.	
			o	o
Mean temperature of the year.....	48.81	44.16	46.36 in '46	42.16 in '56
Warmest month .....	August.	July	July, 1868	Aug. 1860
Mean temperature of the warmest month.....	67.37	67.33	75.80	64.46
Coldest month.....	December	February	Jan. 1857	Feb. 1848
Mean temperature of the coldest month.....	19.90	22.97	12.75	26.60
Difference between the temperatures of the warmest and the coldest months.....	47.47	44.36	...	...
Mean of deviations of monthly means from their respective averages of 31 years, signs of deviation being disregarded.....	2.81	2.42	3.59 in 1843	1.31 in 1864
Months of greatest deviation without regard to sign .....	December	January	Jan. 1857	...
Corresponding magnitude of deviation .....	6.14	3.87	10.4	...
Warmest day .....	Aug. 4	...	July 14, '68	July 31, '41
Mean temperature of the warmest day.....	76.13	77.73	84.60	72.75
Coldest day.....	Feb. 4	...	Feb. 6, '55 Jan. 22, '57	Dec. 22, '42
Mean temperature of the coldest day .....	-7.2	-1.05	-11.38	9.57
Date of the highest temperature.....	Aug. 16	...	Aug. 24, '54	Aug. 19, '40
Highest temperature .....	89.5	90.8	90.2	82.4
Date of the lowest temperature.....	Dec 21	...	Jan. 10, '59	Jan. 2, '42
Lowest temperature.....	-21.0	-12.1	-26.5	1.9
Range of the year.....	110.5	102.9	118.2	87.0

## BAROMETER.

	1871.	Average of 30 years.	Extremes.	
Mean pressure of the year.....	29.6066	29.6171	{ 29.6670 in 1849	29.5602 in 1864
Month of highest mean pressure.....	January	Sept.	Jan. 1849	June, 1864
Highest mean monthly pressure.....	29.7590	29.6686	29.8048	29.6525
Month of lowest mean pressure.....	April	May	March, 1859	Nov. 1849
Lowest mean monthly pressure.....	29.4584	29.5684	29.4143	29.5886
Date of the highest pressure in the year.....	Jan. 25, 2 p.m.	...	Jan. 8, '66	Jan. 14, '70
Highest pressure.....	30.388	30.374	30.940	30.212
Date of the lowest pressure in the year.....	Feb. 18, 6 a.m.	...	Jan. 2, '70	Mar. 17, '45
Lowest pressure .....	28.673	28.680	28.166	28.939
Range of the year .....	1.715	1.694	{ 2.133 in 1866	1.303 in 1845



## RELATIVE HUMIDITY.

	1871.	Average of 29 years.	Extremes.	
Mean humidity of the year .....	73	77	82 in 1851	73 in 1858
Month of greatest humidity .....	January	January	Jan. 1857	Dec. 1858
Greatest mean monthly humidity .....	84	83	89	81
Month of least humidity .....	May	May	Feb. 1843	April, 1849
Least mean monthly humidity .....	63	71	58	78

## EXTENT OF SKY CLOUDED.

	1871.	Average of 18 years.	Extremes.	
Mean cloudiness of the year .....	0.64	0.61	0.66 in '69	0.57 in '56
Most cloudy month .....	December	December	...	...
Greatest monthly mean of cloudiness .....	0.81	0.75	0.83	0.73
Least cloudy month .....	June	August	...	...
Lowest monthly mean of cloudiness .....	0.46	0.48	0.29	0.50

## WIND.

	1871.	Result of 23 years.	Extremes.	
Resultant direction .....	N 72° W	N 60° W	...	...
Resultant velocity in miles .....	2.49	1.89	...	...
Mean velocity, without regard to direction .....	8.24	6.96	8.55 in '60	5.10 in '53
Month of greatest mean velocity .....	December	March	March, 1860	Jan. 1848
Greatest monthly mean velocity .....	11.52	8.83	12.41	5.82
Month of least mean velocity .....	Sept.	July	Aug. 1852	Sept. 1860
Least monthly mean velocity .....	6.50	4.96	3.30	5.7C
Day of greatest mean velocity .....	Nov. 15	...	Nov. 15, '70	Dec. 2, 1848
Greatest daily mean velocity .....	32.18	23.12	32.16	15.30
Day of least mean velocity .....	Sept. 12	...	...	...
Least daily mean velocity .....	0.87	...	...	...
Hour of greatest absolute velocity .....	Dec. 20, 11 a.m. to noon.	...	Dec. 27, '61, 9 to 10 a.m.	Mar. 14, '53 11 to noon.
Greatest velocity .....	45.0	39.2	46.0	25.6

## RAIN.

	1871.	Average of 31 years.	Extremes.	
Total depth of rain in inches .....	22.771	29.302	43.555 in '43	19.041 in '67
Number of days in which rain fell.....	110	109	130 in 1861	80 in 1841
Month in which the greatest depth of rain fell.	June	Sept.	Sept. 1843	Sept. 1848
Greatest depth of rain in one month .....	3.340	3.797	0.760	3.115
Month in which the days of rain were most } frequent.....	April	October	Oct. 1864, June 1869.	May, 1841
Greatest number of rainy days in one month...	17	12	22	11
Day in which the greatest amount of rain fell..	Nov. 14	...	Sept. 14, '43	Sept. 14, '48
Greatest amount of rain in one day.....	2.310	2.004	3.455	1.000

## SNOW. †

	1871.	Average of 28 years.	Extremes.	
Total depth in the year in inches.....	99.6	68.1	122.9 in '70	38.4 in '51
Number of days in which snow fell.....	81	62	87 in 1859	33 in 1848
Month in which the greatest depth of snow fell.	January	February	March, 1870	Dec. 1851
Greatest depth of snow in one month .....	43.6	19.17	62.4	10.7
Month in which the days of snow were most } frequent.....	January	January	Jan. '61, '71	Feb. 1848
Greatest number of days of snow in one month.	23	14	23	8
Day in which the greatest amount of snow fell.	Feb. 17	...	Feb. 5, 1863 Mar. 27, '70	Jan. 10, '57
Greatest fall of snow in one day .....	12.0	9.3	16.0	5.5

DIFFERENCE OF CERTAIN METEOROLOGICAL ELEMENTS FROM THEIR NORMAL VALUES FOR EACH  
QUARTER, AND FOR THE YEAR, FROM DECEMBER, 1870, TO NOVEMBER, 1871.

QUARTERS.	Barometer.	Temper- ature.	Rain.	Days Rain.	Snow.	Days Snow.	Velocity of Wind.	Clouded Sky.
		o	in.		in.		miles.	
Winter .....	0.0000	0.00	-0.481	+ 2.72	+33.32	+ 9.50	+ 1.95	+ .03
Spring .....	- 0.0396	+ 3.20	+1.462	+ 4.07	- 0.33	- 0.01	+ 0.41	+ .04
Summer.....	- 0.0392.	- 0.08	-1.913	- 1.42	...	...	+ 1.26	- .02
Autumn.....	+ 0.0216	- 2.32	-1.083	- 2.67	+ 1.27	+ 5.29	+ 1.52	+ .06
Year .....	- 0.0143	+ 0.20	-5.015	+ 2.70	+34.21	+14.78	+ 1.38	+ .03

## PERIODICAL OR OCCASIONAL EVENTS, 1871.

- January 17. Bay frozen over completely.  
 " 31. Snow almost disappeared.  
 February 17. Severe snow storm from N. E.  
 " 28. Crows seen.  
 March.... 1. Robins seen.  
 " 2. First thunder storm.  
 " 10. Blue birds arrived in neighbourhood.  
 " 13. Ice on bay broken up and mostly driven into lake.  
 " 18. First schooner left.  
 " 18. Wild geese passing.  
 April .... 6. Swallows arrived.  
 " 7. Butterflies seen. Frogs heard.  
 " 12. Last snow.  
 " 13. Steamer "City of Toronto," first trip.  
 May ..... 8. Last ice.  
 " 13. Humming birds.  
 " 15. Baltimore birds.  
 " 18. Woodpeckers.  
 " 21. 1 a.m.—shock of an earthquake felt generally in Canada.  
 " 30. Fireflies seen.  
 June..... 16. Last frost of season.  
 August... 20. Vegetation suffering very much from the want of rain.  
 " 22. Swallows gone. Nighthawks numerous.  
 Sept..... 18. First frost of season.  
 " 21. First ice.  
 Oct..... 17. First snow, very slight.  
 Nov. .... 14. Heaviest rain storm of the year, followed by a furious gale of wind from the N. W.  
                   Average velocity, 32.16 miles; the most windy day recorded here.  
 " 15. First snow storm.  
 " 30. River Don frozen.  
 Dec. .... 13. Bay frozen and crossed.  
 " 15. Sleighting in city.  
 " 21. Lowest temperature of year, and the lowest recorded in any December. For a short  
                   time at the beginning of this cold spell the velocity of the wind was 62.0 miles  
                   per hour.

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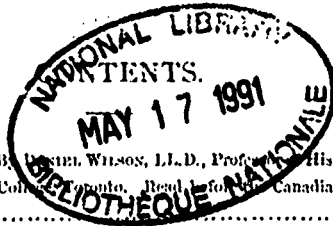
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