The Canadian Journal.

TORONTO, APRIL, 1855.

Passing Visits to the Rice Lake, Humber River, Grenadier's Pond, and the Island.

MADE BY DR. GOADBY AND J. BOVELL, M.D., TRIN. COLL., TORONTO.

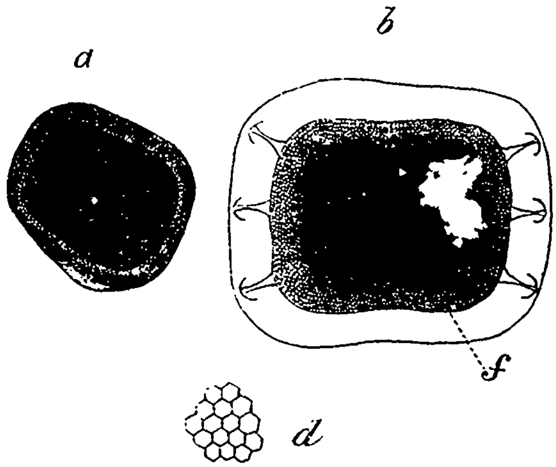
(*Specimens exhibited before the Canadian Institute, Dec. 17th, 1854.*)

We devoted one fine morning to a hasty visit to Rice Lake to fish: we spent about three hours there, and on our return we directed our attention to collecting things microscopical.

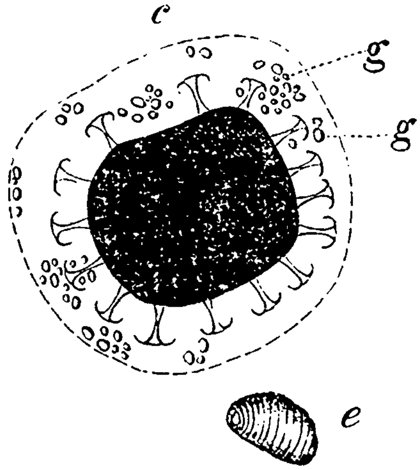
A gentleman, who accompanied us, had long resided at the Lake, and described a peculiar jelly-looking substance which he had seen on a submerged stick, and undertook to row us to the very spot; he did so, and introduced us to a magnificent Polypidom of Plumatella! It measures eight inches by five inches, and necessarily contains many thousands of Polypes.

The Plumatella is a Bryozoon, or Ciliobranchiate Polype, that is to say its tentacles, or arms, are covered with vibratile cilia. Not being provided with a microscope, we could not make an examination on the spot, but had to convey the specimen home to Toronto; and here, even, circumstances prevented us working at it until nearly too late, as the animals died, and almost immediately decomposed. From what we did see, however, there is some reason to conclude that this species differs from the European animal, not merely in the form of the cells, but in the animal itself, which is certainly larger, and appears to possess a much greater number of tentacles.

In making microscopical examinations of thin slices of this Polypidom, we were struck with the appearance of a great number of bodies such as represented at *a*, and for some time we necessarily concluded that we were gazing upon the ova of the Polype, in various stages of developement, as shewn at *b* and *c*, in the same figure. The central mass is entirely, and densely dark, while the narrow, somewhat transparent margin seen at *a*, is remarkably cellular, being composed entirely of hexagonal cells, of much regularity in their form and size (*d*). These cells are again seen in *b*, at *f*, where, also,

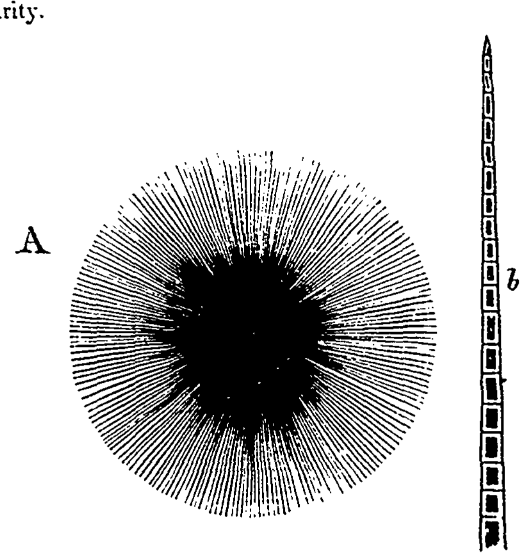


we see developed six hooks—three at either end; at *c*, the hooks appear to have attained their maximum developement. In examining the specimens by *direct light*, (as opaque objects), the cells are seen to be continuous over the entire surface. The presence of *cells* offers no objection to the animality of these bodies, whilst the *hooks* remind one so forcibly of the ovum of Cristatella mucedo, (a fresh water polype) as figured by the late Sir J. G. Dalyell, Bart., Raspail, Cornelius Varley, that it left little doubt these were the indubitable ova of the Plumatella, when, presently, several of the mature bodies appeared, their surface being more or less covered with *corpuscles of starch*, as shewn at *g. g.* in *c*—this was at



once conclusive of their *vegetable* character, and they necessarily resolve themselves into a new species of Xanthidium. An enlarged corpuscle of starch is shewn at *e*.

As compared with all other known species of Xanthidia, these are remarkable for the possession of a membrane, of inconceivable transparency and delicacy *beyond the* hooks, and, it is just possible that other species, if seen in a sufficiently fresh state, would also present a membrane of like tenuity; altogether, one cannot but regard these specimens as throwing much light on the true structure and affinities of such bodies in general, whose history has been hitherto involved in much obscurity.



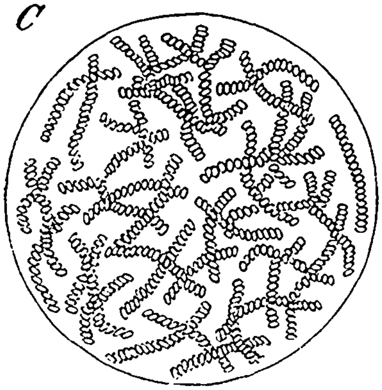
In visiting the Humber Bay a new order of beauties awaited us, in the form of very minute (microscopical) algæ. A represents one of these singularly beautiful plants, which is parasitic upon the stems and leaves of other plants, decayed wood, &c. In shape it is perfectly circular, composed, apparently of radii from the centre to the circumference; the plant is beautifully and intensely green.

The element of this plant, as analyzed by much higher magnifying power is shewn at *b*, it consists of a number of cells, each one being nearly square, and containing a dense, square shaped nucleus—the series of cells taper up to an exceedingly fine point (*b*).

It is worthy of remark, that Dr. Leidy, of Philadelphia, has described, in a paper entitled "The flora and fauna within Animals," and published by the Smithsonian Institution, a plant very much resembling this, as having been found by him in the stomach of one species of Julus, *which is a vegetable feeder*; and as we find the plant existing in great abundance, we cannot but think that, so far from constituting a parasitical growth in the creatures stomach, that it had simply conveyed the specimens found, into its interior, as its legitimate food.

We found, also, a very singular plant perfectly spherical, and in that form we could gain no idea of its structure; on making a section of it, it presented the appearance represented at *C*,—

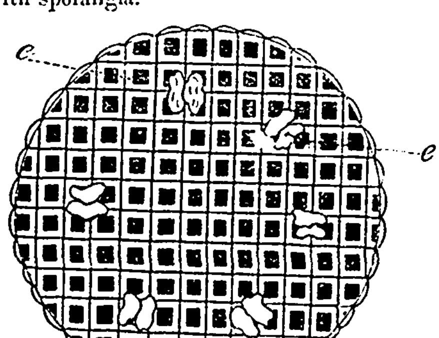
C



being composed of isolated strings of cells, which crossed each other in all directions. These cells are beautifully green, and contrast favourably with the remarkably diaphanous ground on which they are placed: one cannot at all see how these strings of cells are connected together, there is no appearance of membrane, and yet a definite form is given to the mass—doubtless, the very transparent something is the *collenchyma*, described by Mohl and Henfrey.

There is some doubt whether this be a perfect plant; that the former specimen is so, admits of no doubt, as its surface was covered with sporangia.

D



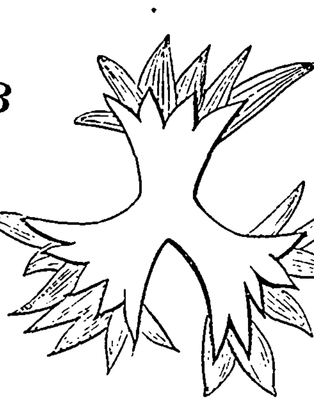
Another alga remains to be described; it is seen at D, and is as beautiful as its predecessors. The entire plant is discoid, such as represented; no section, or manipulation of any kind has been attempted here. It will be seen that the entire surface is divided into a series of square cells, each one containing a nucleus of densely coloured green matter—the regularity of these cells is very remarkable. That this is a perfect plant is evidenced by the sporangia shewn at *c*, *c*, which are really much more numerous on the original, than represented in the figure.

To the best of our belief, this and the preceeding plants are entirely new, not having been described by any one so far as we know.

From the Grenadier's pond we obtained a beautiful specimen of Conferva *in conjugation*, (zygnema quininum?) which latter fact gives it a sole claim to notice here. The cells of chlorophylle have been aggregated in the upper cells, and passed by the connecting tubes, developed for the purpose, into the lower series of cells which belong to the other plant, in which they appear as rounded masses.

This process accomplished, the inosculating lips part, and each plant walks away whither it will; it is most probable that the upper exhausted tubes are left to perish, whilst the developement of new growths takes place from the fecundated lower cells.

B

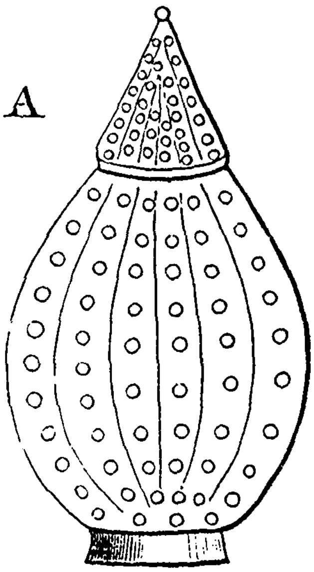


Many specimens of Spongia-fluviatilis we found, and amongst them a new species, if we may judge from the form of the siliceous spiculæ. B is a figure of a spiculum, remarkable for its tri-radiate character.

From a pond on the Island we obtained a Conferva, of singular minuteness, also caught in the act of conjugation, but the period is a very important one, namely, the large masses of chlorophyle are seen in transitu—tightly wedged in the tube which, for the present, connects the two plants.

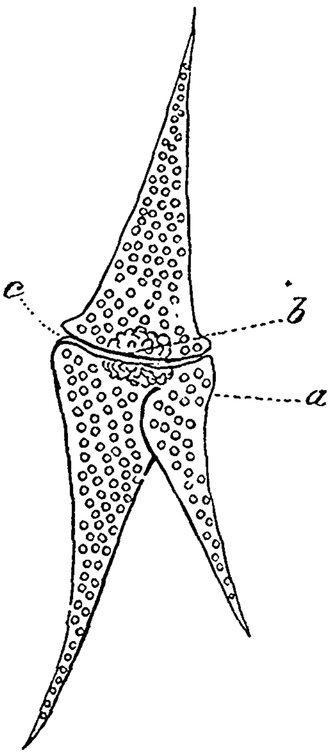
The Island of Barbadoes is remarkable for the possession of a Chalk containing a very large per centage of the (presumed) loricæ of extinct animalcules. Their size is (microscopically speaking) colossal, and they exhibit forms not found any where else in the known world. A figure of one of them, resembling a jar with a lid to it, is shewn at A.

A



Strangely enough, the Island ponds, opposite Toronto, favored us with specimens, also silicious, and bearing nearer affinity to the fossils of Barbadoes than any yet discovered, so far as we know.

B



B, represents one of these animals (?)—it was alive when we examined it, and moved about the field with a gliding motion. At *a*, is represented a limb which possesses a joint, by means of which it can open and shut at pleasure; *b*, shews a flocculent mass, which gave an idea of *food*, while *c* represents a curious trumpet-shaped termination which, from the frequency of finding them, appears to be easily detached: finally, the entire surface is covered with very minute tubercles.

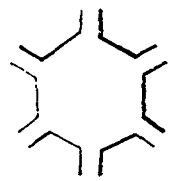
All the specimens here described, have been converted into permanent preparations, and it is hoped that the above description of them will prove interesting to the members of the Canadian Institute.

ADDITIONAL OBSERVATIONS BY J. BOVELL, M.D.

The Bear

Within the last few weeks I have had the opportunity of examining the alimentary canal of the brown Bear of this Province, which presents some interesting points for observation.

First, the œsophagus.—This tube on being submitted to microscopic examination, furnishes an exception to the general rule with reference to the form of muscular fibre found in it. In works on Physiology and Anatomy, it is stated that striped muscular fibre exists in the upper third only; the lower portion possessing non-striped fibre.* Messrs. Todd and Bowman, however, observe, "In some specimens from the human subject, we have failed in detecting any (striped fibre) in the lower half of that tube, either in the circular or longitudinal layer; but in another example we have found them to within an inch of the stomach." Beale, in his Clinical Medicine, notices the presence of striped muscle in the œsophagus of tench. In the Bear I find that striped fibre exists throughout the whole tube, terminating in an abrupt line with its convexity towards the stomach. In the rest of the stomach and intestines there is ordinary plain fibre. The villi of the intestines are very varied in form. In the duodenum they are exceedingly elongated and densely packed; injected with chromate of lead their vascularity is beautifully shown, and the arrangement of the vessels at the base of each villus is distinctly brought out, and it appears that the vessels of all the villi are in communication; thus, supposing six villi placed together, the vessels at the base present the following arrangement:—



In this portion of the intestinal canal, they also present broad bases and very obtuse apices. In the ilium they are considerably smaller, and cluster in greater numbers on and around the raised margins of the Payerean Patches. In the large intestine the villi have disappeared, and, as in other animals, have more the appearance of a stomach; the net work of beautiful capillaries, rendering the organ intensely vascular. Here, however, is another peculiarity noticed,—along the whole length of this large tube an unbroken chain of glands, about one quarter of an inch in width, runs, having short villi covering the surface. This arrangement gives one the idea that the plain surface of the intestine may perform the office of a second stomach, while the long chain of glands is a real excretory apparatus.

The Lobster.

There is one other subject which I desire to bring before the Institute, with the view to obtain information. While engaged in dissecting a lobster, my attention was particularly directed

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* I cannot procure a reference to Mr. Gulliver's papers.

to the branchial organs,—perceiving that the structure of the branchiæ was much more dense than seemed consistent with the character of a directly aerating surface, I endeavoured to open out the tubes for the purpose of more minute examination. In doing so, I easily divided the tubular case, but found an inner membrane lining it; by traction, this was completely withdrawn, presenting a perfect cast of the main tube and the small fringed tubules. On reference to Carpenter's Physiology, to the Encyclopædia of Anatomy, Seibold's Comparative Anatomy, and Jones's Animal Kingdom, I can find no allusion to such a membrane, although the illustration given by Mr Jones, and taken from the Hunterian collection, would lead to the inference that Mr. Hunter knew of the existence of the structure in question. The following is Mr. Jones's account: "Setting out from the heart, we find that the blood goes to all parts of the body through the different arterial trunks, and by the great sternal artery is conveyed to the legs, foot-jaws, and false feet. But from this same artery vessels are furnished to the branchiæ. The branchial arteries, so divided, subdivide into secondary trunks, which ramify through the individual branchiæ and supply all their appended filaments." The blood-vessels could not ramify on the fibrous tube; the inner membrane, therefore, is the bed in which the vessels repose, the outer case being, like the cartilaginous rings of the branchial tubes, organs of support. How, then, is aeration effected under such circumstances? On placing the terminal branchia with the small appended tubules under the half-inch object glass, we find that the surface of each is even, and that the membrane is not perforated by foramina. Comparatively dense, therefore, as the substance is, it yet must permit the passage of gases through it; and, indeed, Professor Draper's experiments with membranes and septa equally dense, afford evidence that such must be the case. In the structure of the breathing organs of this class, we find an arrangement admirably adapted both to terrestrial and aquatic respiration. Living amongst shoals, and therefore liable to be left at times high and dry, the creature would undoubtedly perish, if provision was not made for its safety. The water, therefore, which enters the branchial chamber is retained for the purpose of moistening the bronchiæ, while atmospheric air has free access to the inner membrane through openings at the base of the principal branches

Account of an Extraordinary Sudden Fall in the Waters of the Niagara River.

(Communicated to the Canadian Institute, by Major R. Lachlan, Montreal.)

In the paper on the Periodical Rise and Fall of the Lakes, which I had, last year, the honour of presenting to the Institute, I alluded to examples of the almost entire temporary obstruction of the different Lakes, and more particularly of Lakes Huron and Erie: and I proposed appending to that Essay, some account of one remarkable instance which occurred in March, 1848, between Buffalo and Fort Erie, at the head of the Niagara river. Circumstances having obliged me to postpone that intention, I now beg to be allowed to redeem my pledge, by laying before the Association the document in question, as of considerable philosophical interest,—though possessing no literary merit—and therefore sufficiently deserving of being placed on permanent record. And, to add somewhat to the value of such a paper, I prefix thereto, a sketch map of the course of the Niagara River, from its efflux from Lake Erie, to its junction with Lake Ontario, as likely to make the whole subject more readily understood.

I need only add, by way of further introduction, that, as stated in my paper on the Rise and Fall of the Lakes,* I was so much struck with the notices of this singular phenomenon which appeared in neighbouring local journals, immediately after its occurrence, that I was induced to write to a friend residing in the vicinity, for further information on the subject; and that this paper will consequently be found to consist of two distinct parts: the one composed of the particulars gleaned from the public prints; the other consisting of the additional information acquired from the gentleman alluded to; and that, as done on other occasions, I have allowed my authorities to speak for themselves, in their own language, in preference to putting together any second description of my own.

With regard to the first branch of the subject, my notes proceed as follows:—

I.

The following particulars respecting the extraordinary obstruction of the waters of the Niagara River, in the winter of 1848, were gleaned from a telegraphic despatch, dated Queenston, 30th., and the *Buffalo Commercial Advertiser* and *Buffalo Express* of the 31st of March:

"This morning, (30th March) was witnessed on the Niagara River, an unprecedented spectacle of wonder, long to be remembered in connexion with the Falls. Suddenly, the water *fell* to a considerable extent, so that the Table rock was sufficiently dry to enable those who were fortunate enough to be in the vicinity, to go so far across the river, as to be directly over the tremendous rock. This truly astonishing feat was accomplished, among others, by ladies; and although the water in some degree returned the same day, a memento of their journey towards the horse-shoe centre, was left, in the form of a pole erected thereon.

"The villagers of Chippewa (about two miles above the Falls) thought they had entirely lost their creek. Off the old Chippewa fort, about one hundred feet beyond the usual low-water mark, was discovered a burning spring, in the bed of the Niagara, which some one had the curiosity to enclose with an old potash kettle, with a gun-barrel knitted therein,† and succeeded in producing flames, and a loud explosion. Several bayonets, muskets, swords, &c., were also picked up. The water returned to nearly its usual level in the course of the day

"The cause of this occurrence was conjectured to be an accumulation of ice at the egress of the river from Lake Erie having for a time closed up the outlet—and such proved to be the case: it being stated in the *Buffalo Commercial Advertiser* of the 31st of March, that the river at Black-rock (about three miles below Buffalo) fell 3 feet on the night of the 29th, and rose about six inches on the 30th: and that they were at a loss to account for this, unless the ice had been packed in some place, so as to obstruct the stream. There had, however, been no remarkable variation in the harbour; and this fact increased the perplexity. At the Falls there was an unprecedented and most plentiful *lack* of water. The creek at Buffalo rose about 6 inches on the 31st."

*See Canadian Journal, vol. 2, p. 293 &c.: but more particularly p. 304.

†The hint must have been taken from a somewhat similar plan having been adopted with a gas-evolving spring, well known to travellers in the vicinity of Chippewa.

2. The following additional interesting details are from the *Buffalo Express* of the 31st, and appear to have been derived from a correspondent at the American village of Niagara Falls, describing the passing events of the preceding day.

"The Falls of Niagara can be compared to nothing but a mere mill-dam, this morning. In the memory of the oldest inhabitant, never was there so little water running over Niagara's precipice as at this moment. Hundreds of people are now looking at that which never had been, and probably never may again be seen. Last night, at 11 o'clock, the factories fed from this majestic river were in full operation: and at twelve o'clock the water was shut off: the wheels suddenly ceased their revolutions: and everything was hushed in silence, except a faint roar of the maddened waters of the Cataract. When the fact was known, astonishment was depicted in every countenance.

"To give some idea of the lowness of the water, Messrs. G. Mamlin and Woodruff this morning rode in a buggy one-third of the way across the river, from the head of Goat-island towards the Canada shore. The wheeling was excellent; the rock being as level as a floor. They drove outside of the island, towards Allan's island, and turned round; a thing which had never before occurred."

3. The following additional particulars are extracted from the *Iris* newspaper (published at the American village of Niagara Falls) of the 31st March:

"The Table rock, and some two hundred yards more, were left dry; islands, and places where man never before dared to tread, were visited—flags placed upon some, and mementos brought away from others.

"Judge Porter, with his troop of blasters, under their active and efficient foreman, James Macafee, were early in the canals (or races) leading to the Mills and Factories; when the thunders of the blast was heard all day on a spot where never before stepped the foot of man; and where, heretofore, the reeking waters forbade too near approach, they now worked with safety on dry land.

(Below the Falls also.) "Rocks, which at very low water had sometimes touched the keel of the steamer "Maid of the Mist," and for the removal of which the captain had made liberal offers, were blown to pieces, and removed with the same ease as if it had been on dry land.

"The cause of this wonderful fall in the waters of the Niagara can only be accounted for by supposing that the large fields of ice in the lower end of Lake Erie had moved down bodily, and formed a sort of dam, between Fort Erie and Buffalo. The water is still low, but gradually rising."

II.

My curiosity being naturally much excited, and little satisfied by the perusal of the foregoing interesting notices, I resolved to endeavour to learn some further particulars, and I, accordingly, on the 11th of May following, addressed a note to a friend residing in the neighbourhood of Fort Erie, (Mr. E. Anderson, now Collector of Customs at Amherstburg) begging that, in addition to stating how far the newspaper accounts were correct, he would kindly endeavour to clear up the following points:— 1. How it was that, as stated in the *Buffalo Advertiser*, though the river fell 3 feet at Black-rock, there was still no remarkable variation in the harbour of Buffalo. 2. Whether the jam, supposed, in the *Iris*, to have taken place, did actually occur between Fort Erie and Buffalo, and if not, where and when did it take place. 3. What is the usual difference of level in the water at Black-rock, compared with the head of the Rapids and the harbour at Buffalo. 4. Whether any of the old inhabitants of the neighbourhood had any recollection of a similar occurrence; and if so, how long ago, and how often within their memory.

To this letter, I was obligingly favoured with a reply, from which I extract the following valuable and interesting particulars:—

1. "The phenomenon you refer to, I recollect perfectly well, as I had the curiosity to go up to the Rapids at the time it happened, for the purpose of examining the ice, &c., and I would say that the accounts of it in the Buffalo and Niagara Falls newspapers are correct.

"Some years ago, the State of New York built a sea-wall from the American side of the Niagara River, to Bird-island Reef, to form a feeder for the Erie Canal, which made the exit of Lake Erie much more narrow than the natural bed of the river. In the centre of the river, between old Fort Erie, on the Canada side, and the head of the sea-wall on the American side, is a large reef of rocks, not more than two feet under water; and on each side of this reef are two channels, in one of which there is ten feet water, and in the other, on the American side, 8 feet water.

2. "When I went to examine the Rapids, the main channel opposite old Fort Erie, was completely jammed with large cakes of ice, piled one on top of the other; and the Lake as far as the eye could carry, was in the same state, but more so on the Canadian shore than the American. This will account for the water falling 3½ feet below the usual level of the river. You will also recollect that there is a large creek running into the harbour at Buffalo, that would tend to keep the water up to the usual height *there*.

3. "The difference of level between Buffalo harbour, and the Niagara River below the Rapids is 5 feet. I do not know that there is any between the head of the Rapids and Buffalo.

4. "The phenomenon lasted nearly two days. Colonel Kirby, (Collector of the Customs) one of the oldest inhabitants of Fort Erie, has no recollection of anything of the kind before this."

To the above may be added, that it was on this occasion, as I afterwards learnt, that the Niagara, after indignantly bursting its temporary winter chains, continued rushing furiously on from the Falls in an accumulated roaring avalanche of crashing ice and foaming waters of great height, past Queenston and Niagara, sweeping along with it whatever trees, rocks, mills, and wharves lined the banks, until it at length settled calmly down on the broad bosom of Lake Ontario.

Such is the amount of the information acquired by me, at this remote distance, regarding this extraordinary phenomenon; but I have no doubt that many members of the Institute, residing nearer the scene of so singular and startling an event may be able to furnish more satisfactory particulars. I may, however, at all events, trust, that having frankly led the way, my humble *mite* will prove acceptable, and that those who are better informed will be disposed to follow my example, as regards not only this, but many other inviting and interesting CANADIAN objects of philosophical investigation.

Remarks on the Planetoids between Mars and Jupiter.

Read before the Canadian Institute, by T. Henning, Esq., March 10, 1855.

Astronomy is, and ever must be, a study of deepest interest,—wide in its range, fascinating in its details, startling in its conclusions. Of all the sciences, perhaps, it has of late years made the most rapid progress. The discovery of new satellites, the facts respecting single stars and binary systems, the revelations of the telescope in regard to the nebulæ, and, lastly, the vast number of cosmical bodies which are found to be revolving in space in obedience to the laws that guide and control the system to which the earth belongs—all indicate the rapid strides which the astronomer is making, and furnish fresh matter for wonder and gratification. It is to the last of these—the numerous planet-like bodies which have of late been detected as they performed their annual course—that I would for a few minutes direct your thoughts this evening, not with the view of propounding any new theories, but chiefly for the purpose of filling a gap which has inadvertently occurred in the Papers reckoned on by the Council.

HISTORY OF THE PLANETOIDS.

Humboldt tells us that it was an opinion of Hellenic antiquity that there were far more than five planets—that many might remain unseen on account of the feebleness of their light and their position. However this may be, it is certain that as early as the days of Kepler, it was surmised that some unseen planets occupied the space that separated Mars from Jupiter. "I have become daring," says he, in a work written at the youthful age of 25, "and place a new planet between Jupiter and Mars, as also (a conjecture less fortunate in its result) another planet between Venus and Mercury; neither of these have been seen, probably on account of their extreme smallness."

Towards the close of the last century, when the distances of the planets from each other and the laws which regulated these distances came to be more intelligently discussed, it was discovered that the surmises of Kepler were correct, and the arithmetical progression at which he hinted was fully examined and dignified with the appellation of a *law*. This numerical relation, which usually receives the name of Bode's *law* of distances, both Lalande and Delambre call "a play of numbers," and others merely "a help for the memory." It holds, however, so prominent a place in connection with the asteroids, that a few observations regarding it may be necessary.

Commencing with Mercury, the planet nearest the Sun—the grand centre of our system—and passing on from planet to planet, there is a ratio of distance between each, which holds true till we reach the orbit of Mars. A mighty gulph of no less than 350,000,000 of miles is then reached, in which no planet was supposed to revolve, and in which the duple progression failed. As soon, however, as the limits of this intervening space were passed, this curious law again prevailed. Although the succession of distances "does not correspond precisely with a numerical series in duple progression, there is so striking an approximation to it as to produce a strong impression that it must be founded upon some physical cause, and not merely accidental." So thinks Dr. Lardner and many other distinguished astronomers. Bode, however, whose name is so connected with this supposed law, was not even its modern discoverer, for he has stated in one of his works, that "he had taken the law of the distances from a translation of Bonnet's 'Contemplation de la Nature,' prepared by Professor Titius at Wittenberg." In a note added to a certain chapter of the work referred to (which appeared in 1772), and which I quote as found in the fourth volume of the "Cosmos," for the *purpose* of showing what was the scheme proposed to represent the distances of the planets, Professor Titius says—"When the distances of the planets are examined, it is found that they are almost all removed from each other by distances which are in the same proportion as their magnitudes increase. If the distance from Saturn to the Sun is taken as 100 parts, the distance of Mercury from the Sun is 4 such parts (how the Professor obtained the number 4 for the orbit of Mercury is not stated); that of Venus 4+3=7 such parts; the Earth 4+6=10; Mars 4+12=16. But from Mars to Jupiter there is a deviation from this accurate (!) progression. Mars is followed by a space of 4+24=28 such parts, in which neither a principal planet nor a subordinate planet has yet been seen. Is it possible that the Creator should have left this space empty? It cannot be doubted that this space belongs to yet undiscovered satellites of Mars; or that, perhaps, even Jupiter has further satellites around him, which have not hitherto been seen by any telescope. In this space, (unknown to us as regards its contents) Jupiter's circle of action extends to 4+48=52. Then follows Saturn in 4+96=100 parts—*an admirable proportion*." The following table will show more clearly this "admirable proportion." It will be seen from the last line, which represents the observed planetary distances, that, although not exact, there is a very close approximation:—

	M.	V.	E.	M.	Ast.	Jup.	Sat.	Ur.	Nep.
	4	4	4	4	4	4	4	4	4
	0	3	6	12	24	48	96	192	384
Dis. by Bode's law..	4	7	10	16	28	52	100	196	388
Obs. Plan. Dis.......	3·9	7·3	10	15·2	27·4	52	95·4	192	

Since, however, the credit of this theory is attributable to Titius, if not to his predecessor Kepler, the honor of making it practically useful *in detecting the existence of a planet in the* space referred to is shared by the celebrated Baron de Zach of Gotha and Professor Bode of Berlin, the former of whom is said to have commenced a computation of its orbit as early as 1784. Under the Baron's auspices, a congress of astronomers met a Lilienthal in 1800, for the purpose of agreeing to some plan of hunting down this unknown body whose presence was deemed almost certain. Twenty-four observers were present. They agreed to divide the heavens into as many zones, giving one to each astronomer. They commenced their labours on the first day of the first year of the present century, and scarcely had they got their instruments adjusted, before Piazzi of Palermo, one of their number, noticed a small star of about the 7th or 8th magnitude, which was not registered in his catalogue. The next night, to his inexpressible delight, he found that it had changed its position; that, in fact, it was a planet. Baron de Zach heard of the discovery with great joy, commenced a computation of its orbit, the result of which satisfied him, of course, of the correctness of his favourite law of relative distance. To this youthful member of the system Piazzi gave the name of Ceres. To it has since been added the large number of 32, making in all, up to the present time, a group composed of 33 members, all of which, with the date of their discovery, the names of the parties by whom they were first observed, and the places at which the observations were made, will be seen by the following table:—

PLANETOIDS DISCOVERED UP TO OCTOBER, 1854.

No.	Names.	Date.	Discoverer.	Place
1	Ceres.	1801, January 1.	Piazzi.	Palermo.
2	Pallas.	1802, March 28.	Olbers.	Bremen.
3	Juno.	1804, September 1.	Harding.	Lilienthal.
4	Vesta.	1807, March 29.	Olbers.	Bremen.
5	Astræa.	1845, December 8.	Hencke.	Dresden.
6	Hebe.	1847, July 1.	"	"
7	Iris.	1847, August 13.	Hind.	London.
8	Flora.	1847, October 18.	"	" [Ireland.
9	Metis.	1848, April 25.	Graham.	Markree castle
10	Hygeia.	1849, April 12.	Gasparis.	Naples.
11	Parthenope.	1850, May 11.	"	"
12	Victoria.	1850, September 13.	Hind.	London.
13	Egeria.	1850, November 2.	Gasparis.	Naples.
14	Irene.	1851, May 19.	Hind.	London.
15	Eunomia.	1851, July 29.	Gasparis.	Naples.
16	Psyche.	1852, March 17.	"	"
17	Thetis.	1852, April 17.	Luther.	Bilk, Germany
18	Melpomene.	1852, June 25.	Hind.	London.
19	Fortuna.	1852, August 22.	"	"
20	Massilia.	1852, September 19.	Chacornac	Marseilles.
21	Lutetia.	1852, November 15.	Goldschmidt.	Paris.
22	Calliope.	1852, November 16.	Hind.	London.
23	Thalia.	1852, December 15.	"	"
24	Themis.	1853, April 5.	Gasparis.	Naples.
25	Phocæa.	1853, April 6.	Chacornac.	Marseilles.
26	Proserpina.	1853, May 5.	Luther.	Bilk.
27	Euterpe.	1853, November 8.	Hind.	London.
28	Bellona.	1854, March 1.	Luther.	Bilk.
29	Amphitrite.	1854, March 2.	Albert Marth.	London.
30	Urania.	1854, July 22.	Hind.	"
31	Euphrosyne.	1854, September 1.	Jas. Ferguson.	Washington.
32	Pomona.	1854, October 28.	Goldschmidt.	Paris.
33	Polymnia.	1854, October 28.	Chacornac.	"

It is worthy of remark that a large proportion of the discoverers were but amateur astronomers. Dr. Olbers was a practitioner in medicine. M. Hermann Goldschmidt is an historical painter, who has resided for several years in Paris. He discovered Lutetia with a small ordinary telescope which he kept in his room. Messrs. Hencke and Luther are both amateurs.

It is also worthy of remark that, in several instances, the same asteroid has been discovered by more astronomers than one, quite independently of each other. It was so in the case of Metis, Massilia, Amphitrite, and others. It will also be seen that Mr. Hind's name occurs ten times as a discoverer. Mr. Hind is attached to the private observatory of Geo. Bishop, Esq., which was erected in 1836 in the Regent's Park, London. M. de Gasparis has discovered seven; M. Luther three. Only one has been discovered by an American.

I also subjoin a table for which I am indebted to Professor Loomis, exhibiting the longitude of perihelion, longitude of ascending node, inclination of orbit, eccentricity, mean distance from the sun, and periods in days of each of the asteroids whose elements have as yet been accurately determined:—

ELEMENTS OF THE ASTEROIDS.

No	Name	Distance from Sun	Time of revolution in days	Eccentricity	Inclination of orbit.	Long. of ascending node	Long. of perihelion
1	Ceres	2·766	1680	0·079	11°	81°	150°
2	Pallas............	2·770	1683	·239	35	173	122
3	Juno	2·668	1592	·256	13	171	54
4	Vesta	2·361	1325	·090	7	103	251
5	Astræa	2·577	1511	·189	5	141	136
6	Hebe............	2·425	1379	·202	15	139	15
7	Iris............	2·386	1[illegible]47	·231	5	260	41
8	Flora	2·201	[illegible]	·157	6	110	33
9	Metis	2·386	1346	·123	6	68	72
10	Hygeia	3·149	2044	·101	4	288	227
11	Parthenope.....	2·448	1399	·098	5	125	317
12	Clio............	2·335	1303	·045	8	235	302
13	Egeria............	2·577	1512	085	17	43	120
14	Irene............	2·584	1518	·169	9	187	179
15	Eunomia	2·643	1570	·188	12	294	28
16	Psyche	2·933	1835	·131	3	151	11
17	Thetis............	2·484	1430	·131	6	125	259
18	Melpomene.....	2·294	1269	215	10	150	16
19	Fortuna	2·444	1396	·159	2	211	31
20	Massilia.........	2·401	1359	·145	1	207	99
21	Lutetia.........	2·434	1387	·162	3	80	327
22	Calliope	2·912	1815	·104	14	67	59
23	Thalia	2·645	1571	·240	10	68	123
24	Themis	3·144	2037	·123	1	36	135
25	Phocæa.........	2·401	1359	·253	22	214	303
26	Proserpina	2·588	1522	·069	4	46	175
27	Euterpe	2·348	1314	·171	2	94	87
28	Bellona	2·781	1694	·163	9	145	120
29	Amphitrite	2 546	1481	069	6	356	54
30	Urania.........	2·359	1322	·155	2	308	27
31	Euphrosyne....	2·948	1849	·076	23	33	352
32	Pomona						
33	Polymnia						

ORIGIN OF THE ASTEROIDS.

On the discovery of Pallas in 1802, and after Gauss's calculations had proved that the orbits of Ceres and Pallas were at nearly the same mean distance from the Sun, and that they had nearly the same periods, Dr. Olbers conceived the idea that they were fragments of a large original planet, which had been broken up either by internal explosion or by collision with a comet, and suggested the probability that the labors of future observers might be rewarded by the discovery of other fragments, perhaps even smaller than those already found, revolving in similar orbits. In support of this conjecture, it was "urged that in the case of such a catastrophe, as was involved in the supposition, the fragments, according to the established laws of physics, would necessarily continue to revolve in orbits, not differing much in their mean distances from that of the original planet; that the obliquities of the orbits to each other and to that of the original planet might be subject to a wider limit; that the eccentricities might also have exceptional magnitudes; and, finally, that such bodies might be expected to have magnitudes so indefinitely minute as to be out of all analogy or comparison, not only with the primary planet, but even with the smallest of the secondary ones." The conditions which rendered the planetoids exceptional being consistent with this ingenious hypothesis of Dr. Olbers, it was generally regarded as at least a probable truth, and scientific men at once commenced to speculate on the character of the original planet, its history, its size, and its fate. Lagrange, for instance, instituted an investigation to ascertain the amount of force necessary to burst a planet and separate its fragments. "The possibility of determining by calculation, even approximately, the epoch of such a cosmical event as the destruction of a planet," Humboldt considers "more than doubtful, from the complication produced by the already large number of the 'fragments' known, the peculiar retrogression of the apsides and motion of the nodes." This has not, however, deterred ingenious men from investigations respecting this "destroyed planet." Mr. Daniel Kirkwood, of Delaware College, United States, has even ventured to restore from the fragments which remain the primitive planet, in the same manner as others have attempted to restore the animals of the primitive earth. *He finds for it a diameter greater than Mars (of more than 4320* geographical miles), and gives it the slowest rotation of all the principal planets and a length of day of 57 hours and a half. Another American, Professor Alexander, concludes, from the mean of two results separately obtained, that the equatorial diameter of the supposed parent planet was about 50,000 miles, while its polar diameter was scarcely greater than the thickness of the bright rings of Saturn.

As illustrative of the mode in which this supposed original planet may have been broken up, Mr. Nasmyth, in a paper read before the British Association in 1853, referred to the case of the well known toy called "Prince Rupert's drop," viz.: "A drop of glass which has been let fall while in a semi-fluid state into water, by which the surface of the glass drop is caused to cool and consolidate so *rapidly that the subsequent consolidation* and contraction of the interior mass induces such a high degree of tension between it and the exterior crust, that the slightest vibration is sufficient to overcome the cohesion of the external crust, and by so letting free the state of tension to cause the glass drop to fly into thousands of fragments." Applying this to the case of the parent planet of the asteroids, he says: "it may have consisted of such materials as that by the rapid passing of its surface from the original molten condition to that of solidification, while the yet fluid or semi-fluid went on contracting by the comparatively gradual escape of its heat into space through the solid crust, a state of tension may thereby have been induced, such as that in the 'Rupert's drop,' and that the crust may have at last given way with such violence as to cause the fragments to part company, and to pass off, whirling *into orbits, slightly varying* from each other, according to corresponding variations in the condition of each at the instant of rupture."

With the progress of discovery, opinions change. The great inclination of the orbit of Pallas had long presented a difficulty to those who supported the hypothesis of Olbers. The numerous additions made yearly to the sum of the small planets, have confirmed some astronomers in the opinion that the planetoids were formed in the same manner, and according to the same laws, as the other heavenly bodies—that no alteration, in fact, had occurred in the primitive system of the universe. While examining, during last winter, the opinions of astronomers in regard to the small cosmical bodies denominated meteors or falling stars, I had a strong impression that the asteroids would be *found to be similar to these in origin and character, as well as* destiny. I was afterwards confirmed in this opinion by a paper written by Le Verrier, and published in *Silliman's Journal* for July, 1854, in which he overturns the views of Olbers regarding the perturbation of the orbits of the planets, caused by their mutual attraction; and after a thorough investigation of the secular variations of the elements of the orbits, establishes, amongst others, the following propositions:—"1. The eccentricities of the orbits of the known asteroids can suffer only very small changes as the effect of perturbation. These eccentricities, which are now quite large, have then always been and will always remain large. 2. The same is true of the inclination of their orbits. So that the amount of eccentricity and inclination answers to the primitive conditions of the formation of the group."

Amongst the latest hypotheses on the subject of the asteroids, I may state the opinion of the author of that remarkable book, "The Plurality of Worlds," who, it is pretty well known, is Professor Whewell.* "The near coincidence," says he, "of the orbits of the small bodies between Mars and Jupiter, has suggested to astronomers the conjecture that they have resulted from the explosion of a larger body, and from its fracture into fragments. Perhaps the general phenomena of the universe suggest, rather, the notion of a collapse of portions of sidereal matter, than of a sudden disruption and dispersion of any portion of it; and these small bodies may be the results of some imperfectly effected concentration of the elements of our system, which, if it had gone on more completely and regularly, might have produced another planet like Mars or Venus. Perhaps they are only the larger masses among a great number of smaller ones, resulting from such a process; and it is very conceivable that the meteoric stones are other results of the like process—*bits of planets* which have failed in the making, and lost their way, till arrested by the resistance of the Earth's atmosphere. *Their great eccentricity, great deviation from the* zodiacal path, and their great number all fall in with the supposition that there are in the solar system a vast multitude of such *abnormal planetoidal lumps.*"

In a paper on "New Theories of the Universe," prepared for presentation to the British Association at the meeting last year, and with a copy of which I have been favored, the author, *James Bedford, Ph.D.*, of New Brighton, advances some startling doctrines, amongst which is the following regarding these bodies:—"The asteroids," he believes, "were projected in one mass from the sun, as were all the other primary planets; but, like a snowball thrown into the air when not sufficiently compacted, the mass separated where they are found; hence they all move in the same direction as the other planets, which could not be accounted for, *if, as some terrifyingly suppose, they* were originally a world that burst asunder. Verily, a planet once sufficiently condensed, cooled down from its igneous state to become a habitable globe, will *never* burst."

The following are the most remarkable peculiarities of this group of planets:—

1. They are exceedingly small, the largest being at the utmost only 145 geographical miles in diameter. Le Verrier concludes that the sum total of the matter constituting those situated between the mean distances of 2° 20′ and 3° 16′ cannot exceed about *one-fourth of the mass of the Earth*.

2. They occupy a distinct zone in which they circulate, and thus clearly indicate the existence of some peculiar family relationship.

3. The inclinations of their orbits range from zero up to 35°; and the eccentricities from near zero up to more than one

* Since the above was written, it has been found that Mr. J. S. Smith, of Balliol College, Oxford, not Dr. Whewell, is the author of the "Plurality of Worlds."

quarter; those orbits having great eccentricity, have also generally great inclination to the ecliptic.

4. Their orbits so interlace, that, if represented materially as hoops, the orbit of one would support the orbits of all the others; in other words, they all hang together in such a manner, that the whole group may be replaced by any given one; "thus affording," says D'Arrest, "the strongest evidence of the intimate connection that exists amongst them."

Indian Tribes of Canada.

(Read before the Canadian Institute, February 10th, 1855.)

By Wm. Bleasdell, M.A., Trenton, C.W.

Of the first inhabitants of the Province, and especially of the Indian tribes of Western Canada, little is known previous to the settlement of the banks of the St. Lawrence by the French. Apparently too little attention has been paid in times gone by to the preservation of those Indian traditions, which, in the absence of written records and architectural monuments, are the only materials by which an idea of the shadowy past of a nation or a race can be attained.

On the discovery of the River St. Lawrence and the colonization of the lower section of the Province, the north bank of the river, between Quebec and the Ottawa, was occupied by the Algonquin or Adirondac race of Indians. In close alliance with these were the Wyandots or Quatoghies, a tribe of a different stock to the Algonquin—it being a kindred one to the Iroquois. Between the Wyandots and the other Iroquois tribes there existed a deadly feud. On the arrival of Jacques Cartier, the discoverer of the St. Lawrence in 1534, the Wyandots occupied the lower part of the river on the south bank, as far as the Island of Anticosti and the Bay of Chaleurs.

With the Algonquin tribes and the Wyandots the Iroquois Indians waged an incessant warfare, and eventually drove them from the valley of the St. Lawrence—a few only of each tribe remaining there. The bulk of the Algonquins drew off to the north-west, near Lake Nipissing; the Ottawas of the Algonquin stock, who at that time lived also on the banks of the St. Lawrence, migrated to the great chain of the Manitoulin Islands in Lake Huron, and the Wyandots fled to the shores of the same lake, to which they communicated the name they had received from the French, being called by them Hurons.

At the same period came some others of the tribes of the Algonquin stock, and occupied the country between Lakes Huron and Superior and the river Ottawa. The chief and most prominent amongst these are the Chippewas or Ojibwas. These Indians, the most numerous and the most widely spread, were of the true Algonquin race. These are believed, at a comparatively recent period, to have been sub-divided into smaller tribes or divisions, bearing some local name, and differing scarcely in any perceptible degree in language, looks, and customs. Of these the Mississauguas, or Mississaguas, the Indian occupants of the northern shores of Lakes Ontario and Erie, and the Bay of Quinté, were situated most to the south. Their language is pure Algonquin; and they were designated Mississauguas from the fact of their inhabiting the banks of a river of that name, on the north shore of Lake Huron, between La Cloche and Point Tessalon. Spreading southwards from thence, in 1653, they are stated to have extended to the tract of country lying between the Niagara and Genesee rivers, south of Lake Ontario. This could not have continued for any extended period, for they must thus have been intruding on the territory especially claimed by the Iroquois confederacy, with whom the Mississauguas, in common with the other Algonquin races, were embroiled in incessant warfare.

And many a spot by lake and river, on headlands and on islands, bore witness in those days to the fell conflict, and reechoed the startling war-whoop, traces of which struggles in many places remain to this day. In the great Indian and Colonial struggle which raged with such violence during the seventeenth century, and in which the Algonquin tribes and the Wyandots were ranged on one side, supporting the French dominion in North America, and the Five Nations of the Iroquois confederacy were opposed to it, the Eries, a tribe of the same stock as the latter, and inhabiting the banks of the Niagara river and the south shore of Lake Erie, occupied a neutral position, and hence were designated by the French, the Neutral Nation. They eventually offended their kindred of the Five Nations, which led to a war of extermination, that ended in the year 1653. Since that event not a remnant of them has been heard of.

During this period, and a long time previously to this, the Canadian frontier and the shores of Lake Ontario and the Bay of Quinté more especially became the great battle-field of the Indians of the rival races of the Algonquin and Iroquois confederacies, and it formed a sort of debatable ground, which continued more or less until the final conquest of Canada, and the overthrow of the French dominion in North America. In 1672 Fort Frontenac, at the mouth of the river Catararqui, at the outlet of Lake Ontario, was built by that able and energetic Governor of Canada, Louis de Buade, Comte de Frontenac; and this post became a centre of action, from whence the influence of the French was extended in military, trading, and missionary operations to the surrounding country. Thus, in the course of time, Fort Frontenac became the general resort and rendezvous of the Northern and Western tribes of Indians, and the centre of their trade with the French. From all directions they repaired thither, even, it is said, from the distance of 1000 miles, bearing with them the produce of the chase, the rich spoils of the hunter and trapper, to exchange for European goods. From Fort Frontenac, le Salle and de Tonti, with the Recollect Fathers, Louis Hennipen, Membre, and Watteax, sailed westward towards the Mississippi in 1679, and first saw and described the Falls of Niagara.

The former occupants of Western Canada were, as we have seen, then chiefly of the Mississaugua tribe, and these, with others of the Chippewa race and Algonquin stock, and their associate tribe, the Wyandots or Hurons, of the Iroquois stock, may be said to have been those who occupied the Province previously and subsequent to its first colonization by the French, and indeed to its subjection to British rule and enterprise. The Five Nations of the Iroquois confederacy, viz., the Mohawks, Cayugas, Oneidas, Onondagas, and Senecas, having their territory originally comprehended in the present State of New York, though they have had the majority of their tribes settled within the Province since the war of the American Revolution, yet they cannot be considered as the aborigines of Canada, but as refugee Loyalist Indians. Their confederacy was increased by the addition of the Tuscaroras in 1712, and thus they formed the Six Nations. There is, indeed, a tradition that these Iroquois came from beyond the great Lakes, and subdued or exterminated the inhabitants of the country south of them, but there is an uncertainty respecting this, and it proves nothing respecting their origin, for the time might have been when the ancestors of these passed from the south to the country north of the Lakes.

Schoolcraft subdivides the Northern American Indians into the four following groups:—

Iroquois.	*Algonquin.*	*Dacotah.*	*Appalachian.*
1. Mohawks.	1. Chippewas.	1. Omakes.	1. Chickasaws.
2. Oneidas.	2. Ottewas.	2. Oloes.	2. Cherokees.
3. Onondagas.	3. Western Algonquins, chiefly of Lepanee sub-type.	3. Winnebagoes.	
4. Cayugas.	4. Menomeries.	4. Iowas.	
5. Senecas.		5. Dacotahs or Sioux.	
6. Tuscaroras.		6. Quapaws.	
7. St. Regis tribe.			
8. Wyandots.			
9. Senecas and Shawnees.			

The traditions associated with spots where the relics of warfare are found, betoken the fell struggle between the Red men of the rival races, wherever existing, are worthy of preservation as records of men and a state of things which have now almost passed away.

Coleoptera Collected in Canada.

BY WILLIAM COUPER, TORONTO.

[*For authorities and synonyms, see Melsheimer's Catalogue of the Coleoptera of the United States, published by the Smithsonian Institution, Washington.*]

CICINDELA

SEXGUTTATA.—*Mels. Cat.* Green, polished, finely punctured. On each elytron there are three white marginal spots, and a small white spot near the centre; antennæ brown at the tips; lip yellow. Toronto; common. Length 0·5.

PURPUREA.—*Mels. Cat.* Purple-green; margin of elytra golden green: with a white flexuous stripe on each, and a single white dot behind each stripe—white fasciæ at the apex; thorax, top of head, and legs villous; lip white. Toronto, not common. Length 0·65.

DUODECIMGUTTATA.—*Mels. Cat.* Purple red; elytra with a round white dot on the front part: a broad white flexuous stripe in the centre, and behind each stripe another round white dot—white fasciæ at the apex. Rare. Length 0·55

VULGARIS.—*Mels. Cat.* Ground color dull, elytra with two white oblique stripes—the first commences on the front angles, covers a small space on the margin, and extends nearly to the suture; the second from the margin half across the elytra, thence downwards, terminating in an upward curvature, near the suture: two white curved spots at the apex. Toronto, common. Length 0·65.

PUNCTULATA.—*Mels. Cat.* Body narrow, dark purple, polished; elytra with a longitudinal row of light blue punctures, each side of the suture: sometimes they fade; body beneath green; legs hairy, long, and slender. Lake Simcoe. Length 0·45. (Note 1.)

GALERITA

JANUS.—*Mels. Cat.* Thorax red or tile color; elytra azure, finely striate; antennæ villous, black in the middle, the first joint red and long; head dark brown, nearly as long as the thorax; eyes shining black; legs colour of thorax. Toronto, very rare—having taken but two specimens in four summers' collecting. Linne's *Systema Naturæ* says it inhabits Carolina. Probably lat. 44° is its most northern range of distribution. Length 0·75.

BRACHINUS*

VIRIDIPENNIS.—*Mels. Cat.* Head, thorax, legs, and antennæ red; elytra truncate, azure, with elevated lines near the suture. Toronto peninsula; London, C.W. Common. L. 0·4.

CORDICOLLIS.—*Mels. Cat.* Head, thorax, legs, and antennæ red; elytra blue, with a green tinge. Small. Don valley. L. 0·3.

CASNONIA

PENSYLVANICA.—*Mels. Cat.* Head rhomboid, black; thorax long, cylindrical, polished black; elytra truncate, reddish brown, a black fascia on the centre, thus ⌒, which encompasses the margin to the apex, in form something like the letter D. Peninsula, opposite Toronto. July. L. 0·26.

AGONUM

8-PUNCTATUM.—*Mels. Cat.* Dark green bronze; thorax polished bronze; elytra with four punctures on each, *longitudinally* arranged, and near the suture. Toronto,—on the margin of rivers; rare. Length 0·3. (Note 2.)

CUPRIPENNE.—*Mels. Cat.* Head, thorax, and elytra rich metallic polish. This beautiful carab is common throughout the Province. Size of *A. 8-punct.* L. 0·3.

CHLŒNIUS

SERICEUS.—*Mels. Cat.* Thorax polished green; elytra glossy green. When held in the fingers it disgorges a fetid fluid, which produces a colour on them similar to that from the juice of a fresh butternut. Don valley and Peninsula; common under stones, &c. Length 0·6.

TRICOLOR.—*Mels. Cat.* Head golden, polished; antennæ and legs ferruginous; thorax gold bronze, polished, and finely punctured, with a slight groove on the disc, and a curved impression on each side of its posterior edges; elytra dull blue, striate—the striæ finely grooved and densely covered with fine silky hairs. Common on the Peninsula. Length 0·5.

CALOSOMA

SCRUTATOR.—*Mels. Cat.* Elytra striate, green; thorax azure: sometimes violet, with a reflected margin; edge of elytra golden.

A large and brilliant beetle, but rarely taken in this neighbourhood. I found two dead specimens in July, 1854, in drift on the peninsula. Probably they came down the Niagara river, and had been from thence blown across the lake by a south wind. Length 1·2. (Note 3.)

CALIDUM.—Black; elytra with raised crenate striæ, and marked with a triple row of indented gold or copper dots; there are four or five copper dots near the scutel; posterior part of thorax deep, the margin elevated, with a fine longitudinal groove on the disc; antennæ reddish at the tips. Taken by Richardson on the borders of Mackenzie and Slave rivers, in lat. 58°—65° N. Length 1·0.

FRIGIDUM.—Kirby, N. Z. 4, 19. Black, polished; thorax margined and finely punctured (not elevated, as in *Calidum*), with a fine longitudinal groove in the centre; elytra striate—the striæ finely punctured; three rows of indented polished dots on each; no large punctures near the scutel. One living specimen was taken on the Peninsula in July, 1854. L. 0·9

* Our American species of Brachinus are of various sizes, but resemble each other in form and color. The characters by which they are distinguished are very slight. They "possess the singular power of emitting with great force a highly volatile and corrosive liquid, so as to produce a slight explosion."—*Lec.*

ELAPHRUS

RUSCARIUS.—*Mels. Cat.* On the margin of Lake Ontario and at Sturgeon Bay. Small.

OMOPHRON

AMERICANUM.—*Mels. Cat.* Common in April and May, under stones, &c., on the Peninsula, opposite Toronto.

STAPHYLINUS

VILLOSUS.—*Mels. Cat.* Head and thorax black and polished, the front margin of the latter villous; elytra black, polished, with a grey transverse band, on which are three or four small black punctures longitudinally arranged; scutel large, indented; lateral parts of abdomen grey; legs black. Toronto, common. Taken by Mr. Richardson at Lake Winipeg, in lat. 49° N.

VULPINUS.—*Mels. Cat.* Head, thorax, elytra, legs, and tip of abdomen, red. Toronto, common.

CINGULATUS.—*Mels. Cat.* Head, thorax, and elytra villous, and covered with irregular impressions; scutel round, black; two rings at the tip of abdomen and joints of rings underneath of a beautiful yellow satin color. Toronto. Not common.

CRYPTOBIUM

BICOLOR.—*Mels. Cat.* Head black; antennæ, thorax, elytra, tip of abdomen, and legs, red. Margin of Don river common.

CATOGENUS

RUFUS.—*Mels. Cat.* Head, thorax, elytra, and legs red. Found in crevices under the fresh bark of forest trees. The species of this group are very flat—a form well suited to their natural habits.

LUCANUS

DAMA.—*Mels. Cat.* Jaws (♂) long, curved like a sickle, with a small inside tooth towards the point; head broad, smooth; elytra deep mahogany brown, smooth, polished. Length about 1¼ inch, exclusive of jaws.

Jaws (♀) toothed, but much shorter; head narrow. August, on various old trees.

PELIDNOTA

PUNCTATA.—*Mels. Cat.* Oblong-oval; elytra tile color or dull brownish yellow, with three distinct black spots on each; body beneath and legs of a deep bronzed green color. About 1 inch in length. Found at Niagara on the cultivated grape vine in July and August. Flies by day.

AREODA

LANIGERA.—*Mels. Cat.* Broad oval; head, thorax, and elytra lemon-yellow color, glittering like burnished gold; under side of body copper-colored, thickly covered with whitish wool; legs brownish-yellow or brassy, shaded with green. In gardens, chiefly on pear trees. Lat. 44° N.

OMALOPLIA

SERICEA.—*Mels. Cat.* The ground color of this beautiful little lamellicorn is very deep chestnut brown, on which there is a thin tinge reflecting various hues. (Note 4.)

OSMODERMA—GYMNODUS

SCABER.—*Mels. Cat.* Head punctured, concave on the top, with the edge of vizor turned up in ♂; thorax nearly round, wider than long, elytra purplish black, with a coppery lustre, the outer edges entire. Head in ♀ nearly flat, vizor not raised; elytra deeply and irregularly punctured; body beneath smooth; larger than ♂. Found in the hollows of forest trees, especially basswood, in which the larvæ form egg-shaped cocoons. In July; nocturnal.

EREMICOLA.—*Mels. Cat.* Elytra of a deep mahogany-brown color, smooth, and highly polished. Larger than the above, of similar habits, but not so abundant.

CETONIA

INDA.—*Mels. Cat.* Head dark brown, covered with short greenish yellow hairs; thorax triangular, dark copper brown, also covered with greenish yellow hairs; elytra light yellow brown, with pearly and metallic tints, and numerous irregular black spots; scutel large; underside of body black and very hairy. "In April and May it may be seen around the borders of woods and in dry open fields, flying just above the grass, with a loud humming noise, and is often mistaken for a humble bee. The second brood in September is fresher and brighter and found on the golden rod, on corn stalks, on trunks of the locust tree, also on ripe peaches. They have a disagreeable smell."—*Harris.* (Note 5.)

STENURUS—DICERCA

DIVARICATA.—*Mels. Cat.* Head and thorax copper-colored and finely punctured; elytra brassy and densely covered with irregular impressed lines and punctures—spread apart at the apex and obtuse; scutel round concave; breast grooved; body beneath rich copper color.

♂ has a tooth on the under side of shanks of the middle pair of legs. June, July, and August.

LURIDA.—*Mels. Cat.* Antennæ brassy; head, thorax, elytra, body beneath, and legs densely covered with punctures—of a lurid color above—rich copper beneath; thorax has irregular elevated polished spots; elytra with elevated narrow lines arranged in twos and threes.

CHALCOPHORA—BUPRESTIS

VIRGINICA.—*Mels. Cat.* Oblong; reflecting copper color; head deeply indented on top; three elevated black polished lines on thorax; elytra roughly punctured, with two small square spots—on each side towards the margin one elevated smooth line, and a second line near the suture. Some short hairs occupy the grooves on elytra; body beneath sprinkled with short whitish hairs. About 1 inch in length. Appears in May and June on pine trees, the leaves of which they devour.

CHRYSOBOTHRIS—ODONTOMUS

FEMORATA.—*Mels. Cat.* Greenish black above, with a brassy polish; elytra: one impressed spot on each; anterior femora toothed beneath. In June they bask on trees, &c., and are not easily captured, being very active in elevating their elytra for flight.

DENTIPES.—*Mels. Cat.* Thorax finely punctured, and two elevated lines; elytra punctured, with irregular smooth elevated lines, interrupted and divided by impressed spots; body flat, oblong oval, rough like shagreen above, copper color beneath; anterior femora armed with a little tooth. Length about ½ inch. Habits same as above. June. (Note 6.)

ALAUS

OCULATUS.—*Mels. Cat.* Antennæ serrate; thorax black, oblong square, on which there are two oval velvet-like spots encircled by a white ring: the edges are sprinkled with a whitish powder, elytra black, striate, and sprinkled with numerous white spots, which are easily rubbed off. Measures from 1¼ to 1¾ inch in length. In decayed timber. July. Not common.

ELATER--AMPED. S

APICATUS.—*Mels. Cat.* Antennæ black; head and thorax black, finely punctured, and covered with short yellow hairs; elytra pale, with rows of fine punctures longitudinally arranged: the suture and apex black.

LUGUBRIS.—*Mels. Cat.* Head and thorax black, finely punctured, the latter covered with short yellow hairs; elytra red, with rows of fine punctures: black at the apex. (Note 7.)

ARRHENODES

SEPTENTRIONIS.—*Mels. Cat.* Snout nearly straight, equal in thickness throughout; thorax oval, mahogany-brown, smooth and highly polished; elytra striate polished, and darker than thorax, with yellow spots, two of which are near ahe apex.

♂ with jaws, the inside of each is armed with a small tooth. In June and July, on the trunks of white oak. (Note 8.)

ORTHOSOMA

CYLINDRICUM.—*Mels. Cat.* Head black; antennæ short, black, compressed; thorax short, three-toothed; elytra compressed, nearly equal in breadth throughout, of a chesnut color, with three slightly elevated lines on each. Common on pine trees about the middle of July. Length 1¼ to 1½ inch.

ARHOPALUS

FULMINANS.—*Mels. Cat.* Thorax globular, with three black spots, the middle one larger; elytra with angular waved white fasciæ, thus ~; antennæ short, ash colored; scutel black. Toronto; very rare.

EUDERCES

PICIPES.—*Mels. Cat.* Antennæ as long as body; thorax oval, polished, and finely striate on top, narrow behind, with a few yellow hairs each side; elytra in front with a black velvet like spot, on which a yellow band forms an arch. On wild parsnip and other flowers. Small.

CLYTUS

SPECIOSUS.—Say, Am. Ent. 3, t. 53. *Harr. Ins. p. 84. "Head yellow; antennæ and eyes reddish black; thorax black, with two transverse yellow spots on each side; elytra for about two-thirds of their length are black, the remaining one-third yellow,—a yellow spot on each shoulder, —a broad yellow curved band or arch, of which the scutel forms the key-stone, on base of elytra: behind this, a zigzag yellow band, forming the letter W across the middle; another yellow band arching backwards, and on the yellow one-third—a curved band and spot of black; legs yellow; under side of body reddish-yellow, variegated with brown. It is the largest known species of Clytus, being from nine-tenths to eleven-tenths of an inch in length, and three-tenths in breadth. On the trunks of maple trees in July and August."* Rare.

MONOHAMMUS

TITILLATOR.—*Mels. Cat.* Head vertical or perpendicular; antennæ very long; thorax spinous; elytra punctured, with several small black and grey spots. Common. Length 1 to 1¼ inch.

SCUTELLATUS.—*Mels. Cat.* Atennæ twice as long as body; thorax black, polished and densely punctured, with a spine each side; elytra densely punctured—the punctures largest in front; scutel white; body beneath and legs black, polished. Taken by Richardson at Fort Simpson, on the Mackenzie river, in lat. 62° N. Toronto; not common.

TETRAOPES

TORNATOR.—*Mels. Cat.* Head, thorax, and elytra red; antennæ black, with a raised black spot at the base; thorax, with a protuberance each side, and four black spots on top; six black spots on elytra; scutel black; body beneath black. Don valley, on the *Asclepias syriaca.* Rare.

SAPERDA

PUNCTICOLLIS.—*Mels. Cat.* Jaws, eyes, and base of antennæ black; head yellow: a round black spot on the front, and a black conical spot on the top; thorax yellow: with an oblong black spot on each side, and four black spots on the top; elytra black, widely margined with yellow; scutel yellow, slightly raised; suture yellow, and connects at the apex with the exterior margin. Montreal; rare.

VESTITA.—*Mels. Cat.* Densely clothed with short yellowish ash-colored hairs; elytra slightly depressed on top, with a few black spots obliquely placed about the middle. Toronto.

TRIPUNCTATA—*Mels. Cat.* Front of head and antennæ dark brown; eyes black, circular, prominent; thorax yellow: with a black spot on each side of the breast, and two elevated black dots on the top, a third dot near the scutel; in some specimens the middle dots on thorax are wanting; "elytra black, coarsely punctured in rows on the top, and irregularly on the sides and tips, each of which is slightly notched, and ends with two little points."—*Harris.* The form of this beetle is slender, cylindrical. On raspberry. Toronto, not common.

COMPOSIDEA

TRIDENTATA.—Oliv. Ins. 4, 28 Black; densely covered with ash colored pubescence; eyes black, oblong; a rusty-red stripe and two black spots on each side of the thorax; united to a rusty-red stripe on the margin of the elytra, are three oblique teeth of the same color: anterior tooth short and hooked: posterior one encompasses the suture to the apex. L. ½ inch.

DESMOCERUS

PALLIATUS.—*Mels. Cat.* Head narrow; *third and three* following joints of antennæ abruptly thickened at the extremity, giving them a knotty appearance; *thorax conical,* uneven - with little sharp projecting points at each side of the base; fore part of the elytra dull orange color, the other half deep violet or Prussian blue; some specimens are glossed with green. In the centre of elytra the two colors are oblique—each being indented. In June and July on the common elder (*Sambucus Canadensis*). Toronto and Sault Ste. Marie, not common.

(*To be continued.*)

ADDENDA: BY HENRY CROFT.

Note 1. Cic. purpurea...Probably Kirby's Var. D.
" ...Var. G. } Peninsula, rare.
" ...type. }
Cic. punctulata ....Toronto.
Cic. hirticollis.................. "
2. Ag. 8-punctatum........ ......Gardens, not uncommon.
3. Cal. scrutator.................. *Toronto, Darlington.*
Cychrus viduus ....Toronto, rare.
4. Phyllophaga quercina.........common, May beetle.
Omaloplia vespertina ....Toronto, not uncommon.
Macrodactylus subspinosus... " common.
Dichelonycha virescens ...... " "
" testacea........ " "

5. Cetonia fulgida	Humber,	rare.
Trichius rotundicollis	Gardens,	common.
6. Buprestis chrysostigma	Toronto,	common.
,, lineata	,,	,,
7. Melanotus cinereus	,,	,,
Ludius appressifrons	,,	,,
Ctenicerus Kendalli.	,,	,,
Elater obesus	,,	,,
8. Rhynchænus Nenuphar	Plum weevil.	
Bruchus pisi	Pea weevil.	
Balaninus nasicus	rare.	
Hylobius Pales	common.	
Attelabus analis	,,	
,, bipustulatus	rare.	
Rhynchœnus Strobi	common.	
Hylurgus terebrans	,,	
Tomicus exesus?	,,	
9. Arhopalus nobilis	Toronto,	very rare.
,, Robiniæ	Niagara,	common.
Elaphidion mucronatum	Toronto,	rare.
Tylonotus bimaculatus	,,	,,
Oberea mandarina?	,,	,,
Clytus erythrocephalus	,,	not common.
,, ruricola	,,	common.
,, colonus	,,	,,
Cyrtophorus verrucosus	,,	,,
Callidium atennatum	,,	,,
,, violaceum	,,	,,
,, russicum	,,	,,
Criocephalus agrestis	,,	,,
Tetropium cinnamopterum	,,	rare.
Saperda calcarata	,,	very rare.
Graphisurus fasciatus	,,	common.
Liopus adspersus	,,	rare.
,, maculatus	,,	,,
Necydalis mellitus	,,	,,
Rhagium lineatum	,,	,,
Centrodera decolorata	,,	,,
Typocerus fugax	,,	,,
Evodinus monticola	,,	common.
Strangalia Quagga	,,	rare.
,, elegans	,,	,,
,, emarginata	,,	rare, Mr. Ibbetson.
Leptura Canadensis	,,	not common.
,, proxima	,,	,,
,, biforis	,,	,,
,, sphæricollis	,,	,,
,, vittata	,,	common.
,, erythroptera	,,	rare, Mr. Ibbetson.

Mr. Couper having commenced a catalogue of his insects, it is greatly to be hoped that he may continue it, as few persons in Toronto are better qualified for the task, on account of his already tolerably extensive cabinet and his zeal in collecting.

The above list, which may form a sort of appendix to Mr. Couper's catalogue, has been very hurriedly made up from those insects in my collection which are at present labelled. By far the larger portion remain undetermined.

The St. Clair Flats and Lake Navigation.

A Committee of the Buffalo Board of Trade, appointed to inquire into the amount of losses sustained by owners of vessels which have been detained on the St. Clair Flats during the last season of navigation, have recently made a report, from which we gather the following facts:

The number of steamers engaged in the carrying trade of the Upper Lakes, and passing the St. Clair Flats, having a total tonnage of	6,880 tons.
Number of propellers, forty-four, of	21,789 "
Total steam tonnage	28,649 "

The vessels have paid for lighterage, including expenses of same during time detained, and for damages by collisions while aground on the Flats, the sum of $208,000.

There are also of sail vessels engaged in same trade:

Thirty-two barques of	12,231 tons.
Eighty-four brigs of	21,756 "
One hundred and ninety-eight schooners of	48,323 "
Total sail	82,321 "

These vessels, the Committee estimate, have paid out during the season of 1854, for

Towing and lighterage	$168,686 56
Time detained, 5,566 days	220,640 00
Damage for repairs by collisions, &c.	62,800 00
Total sail damage	$452,126 56
Total steam	208,000 00
Total damage	$660,126 56

Emigration during 1854.

The number of passengers who arrived at Quebec in 1854, was 53,183, of whom 52,365 were steerage. The number which left Europe was 51,965 steerage, and 811 cabin; 83 were born on the passage, and 847 died at sea, and 46 at quarantine. 52,326 were landed from the ships; 857 came from the lower Provinces. This return shows an increase on 1853 of 16,484, or nearly 45 per cent., the immigration being larger than in any previous year except 1847, The total immigration since 1829 amounted to 825,187, averaging 31,738 per annum

	1853.	1854.
There sailed from England	9,585	18,175
" " Ireland	14,417	16,168
" " Scotland	4,145	6,446
" " Germany	2,400	5,688
" " Norway	5,056	5,719
" " N. Brunswick	496	857
Total	36,699	53,183

Of those coming from England, 13,471, or nearly three-fourths, were from Liverpool. Of these 2,739 were natives of England, 4,268 of Ireland, 727 of Scotland, 4,613 of Germany, 199 of Norway, 231 of Holland, 641 of Sweden, and 58 of the United States and Canada. 295 Germans sailed from Hull, and 255 from Dublin. The nativity of the whole is shown in the following table:—

	1853.	1854.
Natives of England	3,928	7,353
" " Ireland	18,972	20,269
" " Scotland	4,913	7,186
" " Germany	3,135	11,034
" " Norway	5,133	5,849
" " Sweden	96	910
" " Holland	32	236
" " Switzerland	—	7
" " United States	—	25
" " Canada	—	33
	36,203	52,859

The foreign immigrants were 18,078 against 1,489 in 1853. The increase of English and Scotch was 5,698, and of Irish 1,297.

Tabular Statement of the Mean Results of Meteorological Observations, made at St. Martin, Isle Jesus, C. E., for the Year 1854, by Charles Smallwood, M.D.

(COMPILED FOR THE CANADIAN JOURNAL.)

MONTHS.	Mean of Barometer in inches.	Mean Temp. of Air.	Mean of Humidity.	Amount of Evaporation in Inches.*	Depth of Snow in Inches.	Depth of Rain in Inches.	Days of Snow.	Days of Rain.	Snowing in Hours, H. M.	Raining in Hours. H. M.	Most Prevalent Winds.	Least Prevalent Winds.	Mean of Maximum Velocity.	Mean of Minimum Velocity.	Thunder on Days.	Auroras on Nights.	Range of Barometer	Range of Thermom
1854.																		
January	29·516	10°·92	·843	......	17·98	1·067	12	2	75·55	6·10	N E b E	S	13·82	0·12	..	4	1·519	78°·8
February	·520	12·20	·825	......	23·96	0·150	13	3	79·50	2·00	N E b E	E	14·77	0·00	...	5	1·168	71·7
March	·024	25·84	·840	......	28·61	0·910	12	5	63·25	3·10	N E b E	S S E	23·82	0·58	...	6	1·076	60·4
April	·440	37·75	·835	1·86	4·03	7·886	3	7	5.50	49·10	N E b E	E	11·79	0·03	1	5	0·991	52·2
May	·731	57·17	·723	4·13	......	3·418	...	8	......	32·00	W S W	S	23·98	0·03	...	5	0·708	60·7
June	·814	63·80	·780	2·95	......	8·384	...	10	......	48·50	E N E	N	23·03	0·00	4	2	0·536	46·6
July	·916	76·20	·709	5·12	......	0·174	...	5	......	1·50	S W b W	N	5·94	0·00	2	7	0·565	48·5
August	·910	68·31	·714	4·70	......	2·265	...	7	......	7·45	N W b N	E	17·58	0·00	3	3	0·582	48·2
September	30·001	58·01	·781	3·11	......	6·167	...	11	......	15·16	W	S	11·08	0·00	4	8	0·847	64·2
October	29·949	48·40	·874	1·49	3·10	4·844	...	11	6·10	33·55	W S W	N	14·92	0·00	...	2	1·162	55·5
November	·764	32·99	·878	......	1·10	5·130	3	10	7·45	29·40	W N W	N	15·41	0·95	...	0	1·524	50·6
December	·510	7·35	·850	......	18·67	0·110	10	1	44·31	4·30	N E b E	E	22·25	0·00	...	3	1·534	78·1
WINTER.																		
December	29·456	16·57	·759	......	13·13	0·316	7	1	51·16	2·40	......	......	22·61	0·05	...	3	0·950	62·5
January	·516	10·92	·843	......	17·98	1·067	12	2	75·55	6·10	N E b E	S	13·82	0·12	...	4	1·519	78·8
February	·520	12·20	·825	......	23·96	0·150	13	3	79·50	2·00	......	.... .	14·77	0·00	...	5	1·168	71·7
Quarterly Means	29·497	13·26	·809	......	55·07	1·533	32	6	206·21	10·50	......	......	17·06	0·12	...	12	1·212	70.6
SPRING.																		
March	29·024	25·84	·840	......	28·61	0·910	12	5	63·25	3·10	......	......	23·82	0·58	...	6	1·076	60·4
April	·440	37·75	·835	1·86	4·03	7·886	3	7	5·50	49·10	N E b E	S S E	11 79	0·03	1	5	0·991	52·2
May	·731	57·17	·723	4·13	......	3·418	...	8	......	32·00	......	......	23·98	0·03	...	5	0·708	60.7
Quarterly Means	29·398	40·25	·799	5·99	32·64	12·214	15	20	68·75	84·20	......	......	19·86	0·21	1	16	0·923	57·4
SUMMER.																		
June	29·814	63·80	·780	2·95	......	8·384	...	10	......	48·50	......	......	23·03	0·00	4	2	0·536	46·6
July	·916	76·20	·709	5·12	......	0·174	...	5	......	1·50	S W b W	E	5·94	0·00	2	7	0·565	48·5
August	·910	68·31	·714	4·70	......	2·265	...	7	......	7·45	......	......	17·58	0·00	3	3	0·582	48·2
Quarterly Means	29·880	69·43	·734	12·77	......	10·823	...	22	......	57·45	......	......	15·51	0·00	9	12	0·561	47·4
AUTUMN.																		
September	30·001	58·01	·781	3·11	......	6·167	...	11	......	15·16	......	......	11·08	0·00	4	8	0·847	64·2
October	29·949	48·40	·874	1·49	......	4·844	...	11	6·10	33·55	W S W	S	14·92	0·00	...	2	1·162	55·5
November	·764	32·99	·878	......	1.10	5·130	3	10	7·45	29·40	......	......	15 41	0·95	...	0	1·524	50·6
Quarterly Means	29·901	46·46	·844	4·60	1·10	16·141	3	32	13·55	78·11	......	......	13·80	0·31	4	10	1.179	56·7
Yearly Means, 1854	29·677	41·57	·801	23·36	97·45	40·505	53	80	222·6	231·16	N E b E	S S E	19·53	0·16	14	50	1·017	59·95

* The amount of Evaporation is only observed from April to October, inclusive, owing to Frosty Weather:

On the Clearness of the Atmosphere in Oroomiah, in Persia.

BY REV. T. D. STODDARD.*

Presuming that a letter written to you from ancient Media, and relating to your favorite science, will not be unacceptable, I shall make no apology for the liberty I take in addressing you. My home is in Northern Persia, where I have resided for the last nine years, as an American Missionary to the Nestorian Christians. To give you an idea of our geographical position, I have noted, above, our latitude and approximate longitude. As I wish also to give you a glance at the physical features of this region, let me invite you to come with me upon the flat, terraced roof of my house, where I am sure you will be delighted with the scene before you. Standing at an elevation of more than a mile above the ocean, and a thousand feet above the adjoining country, you may look down upon one of the lovliest and most fertile plains in all the East. Extending for forty miles in length, and from twelve to fifteen in breadth, the district of Oroomiah smiles with hundreds of villages, is verdant with thousands of orchards, and rows of poplars, willows and sycamores by the water-courses, and in the early summer waves with innumerable fields of golden grain. Here the peach, the nectarine, the apricot, the quince, the cherry, the pear, the apple, and the vine, flourish in luxuriance, and give the appearance of a variegated forest. Beyond the plain, you see the lake of Oroomiah, reflecting the purest azure, and studded over with numerous islands, while further on rise distant and lofty mountains, their outlines projected on the cloudless Italian sky, and forming a beautiful contrast with the plain before you. The city of Oroomiah, about six miles distant, which is so embosomed in trees as almost to be hidden from view, is the probable birth-place of Zoroaster; and the mounds which are so conspicuous in different parts of the plain, and which are formed entirely of ashes with a scanty soil upon them, are supposed to be the places where the sacred fire was ever kept burning, and the Persian priests bowed in adoration to the rising sun.

The temperature of this elevated region is very uniform, and the greater part of the year very delightful. During the months of June, July, August, September, and sometimes October, there is little rain, and the sky is rarely overcast. Indeed, I may say that often for weeks together not a cloud is to be seen. As a specimen of the climate in summer, I send accompanying this my meteorological register for the month of August last. The observations were taken at our house on Mt. Seir, but do not differ essentially from those taken on the plain at the same season, except that the thermometer is here a few degrees lower, and the air somewhat drier, especially at night.

No one has ever travelled in this country, without being surprised at the distinctness with which distant objects are to be seen. Mountains fifty, sixty, and even a hundred miles off, are projected with great sharpness of outline on the blue sky; and the snow peak of Ararat, the venerable father of mountains, is just as bright and beautiful when two hundred miles distant, as when we stand near its base. This wonderful transparency of the atmosphere frequently deceives the inexperienced traveller; and the clump of trees indicating a village, which seems to rise only two or three miles before him, he will be often as many hours in reaching.

In this connection, you will be interested to know that the apparent convergence of the sun's rays, at a point diametrically opposite its disc, which, if I mistake not, Sir D. Brewster speaks of as a very rare phenomenon, is here so common that not a week passes in summer when the whole sky at sunset is not striped with ribbons, very much like meridians on an artificial globe.

But it is after nightfall that our sky appears in its highest brilliancy and beauty. Though accustomed to watch the heavens in different parts of the world, I have never seen anything like the splendour of a Persian summer evening. It is not too much to say that, were it not for the interference of the moon, we should have seventy-five nights in the three summer months, superior for purposes of observation to the very finest nights which favour the astronomer in the New World. When I first came here, I brought with me a six-feet Newtonian telescope, of five inches aperture, of my own manufacture; and though the mirrors have since been much tarnished, and the instrument otherwise injured, its performance is incomparably superior to what it was in America. Venus sometimes shines with a light so dazzling that at a distance of *thirteen feet* from the window I have distinguished the hands of a watch, and even the letters of a book.

Some few months since, having met with the statement that the satellites of Jupiter had been seen without a glass, by a traveller on Mt. Etna, it occurred to me that I was in the most favourable circumstances possible for testing the power of the unassisted eye, and I determined at once to make some experiments on the subject. My attention was, of course, first turned to Jupiter, but for a considerable time, with no success. It was always so bright, and shot out so many rays, that it seemed quite impossible to detect any of its moons, even at their greatest elongation from the planet. I varied the experiment in several ways, by looking through the tube of a small telescope, from which the lenses had been taken, and also by placing my eye near the corner of a building, so as to cut off the most brilliant rays of the planet, and yet leave the view unobstructed to the right hand or the left; but in neither cases could I find any satellite. Some time after, I was sitting on the terrace as daylight was fading into darkness, and thought I would watch Jupiter from its first distinct appearance, till it shone out in its full splendour. This time I was exceedingly gratified, just as stars of the first and second magnitude were beginning to appear, to see two extremely faint points of light near the planet, which I felt sure were satelites. On pointing my telescope towards them, my first impressions were confirmed, and I almost leaped for joy at my success. Since that night, I have many times, at the same hour of the evening had a similar view of these telescopic objects, and think I can not be mistaken as to the fact of their visibility. I must, however, add that none of my associates, who at my request have attended to the subjet, are *sure* that they detect them, though the most sharp-sighted individual feels some confidence that he can do so. As these friends, however, are not practical observers, their failure to see the satellites does not shake at all my belief that I have seen them myself.

The time during which these satellites are visible is hardly more than ten minutes. The planet itself soon becomes so bright that they are lost in its rays. I will not stop to discuss the question, in itself a most interesting one, why they are visible at all, when stars of the third and fourth magnitudes are not distinguishable, but merely give you the facts in the case, knowing that you will reason on them much better than I can. Both the fixed stars and the planets shine here with a beautifully steady light, and there is very little twinkling when they are forty degrees above the horizon.

Having come to a satisfactory conclusion about the satellites of Jupiter, I turned next to Saturn. This planet rose so late in the night that I had not seen it while watching Jupiter, and I was curious to know whether any traces of a ring could be detected by the naked eye. To my surprise and delight, the moment I fixed my eye steadily upon it, the elongation was very apparent, not like the satellites of Jupiter, at first suspected, guessed at, and then clearly discernible, but such a view as was most convincing, and made me wonder that I had never made the discovery before. I can only account for it from the fact that, though I have looked at the planet here with the telescope many times, I have never scrutinized it carefully with the naked eye. Several of my associates, whose attention I have since called to the planet, at once told me in which direction the longer axis of the ring lay, and that too without any previous knowledge of its position, or acquaintance with each other's opinion. This is very satisfactory to me, as independent collateral testimony.

I have somewhere seen it stated, that in ancient works on astronomy, written long before the discovery of the telescope, Saturn is represented as of an oblong shape, and that it has puzzled astronomers much to account for it. Am I not correct in this impression? and, if so, is it not possible that here, on these elevated and ancient plains, where shepherds thousands of years ago watched their flocks by night, and studied the wonders of the glorious canopy over their heads, I have found a solution of the question?

After examining Saturn, I turned to Venus. The most I could determine with my naked eye, was, that it shot out rays unequally, and appeared not to be round: but, on taking a dark glass, of just the right opacity, I saw the planet as a very minute, but beautifully defined, crescent. To guard against deception, I turned the glass in different ways, and used different glasses, and always with the same pleasing result. It may be that Venus can be seen thus in England, and elsewhere, but I have never heard of the experiment being tried.

Let me say here, that I find the naked eye superior for these purposes to a telescope formed of spectacle glasses, of six or eight magnifying power. This is not, perhaps, very wonderful, considering that

* From a letter addressed to Sir John F. W. Herschel, dated Oroomiah, Persia, N. Lat. 37°28′ 18″, Long. E. from Greenwich 45° 1′, November 23d, 1852.

in direct vision both eyes are used, without the straining of any one of the muscles around them, and without spherical or chromatic aberration, or the interposition of a dense medium.

As I am an entire stranger, and at the same time am desirous of having these statements make their full impression on your mind, it is proper for me to say that I was formerly for several years a pupil of professor Olmsted of Yale College, New Haven, and have since been admitted to his special friendship; and that I was associated for some time in observations with young Mason, whose early death you have spoken of as a loss to the astronomical world. And though, no doubt, many persons have more accurate habits of observation than myself, a practice of fifteen years has done much to train my eye for researches like these.

You will also bear in mind the great dryness of our atmosphere, indicated by the register, as well as our great elevation Capt. Jacob, (Proceedings of the Edinb Royal Society, vol. ii, No. 36,) in speaking of the extinction of light in the atmosphere, says: "The loss of light in passing from the zenith through a homogeneous atmosphere of 5·2 miles will be ·303. I was much astonished at first discovering that the air had so great absorbent powers, and many ideas are suggested by the fact."

My letter is already becoming tedious, but I will venture to trespass on your patience further. by naming a few test-objects. which would enable you the better to compare the advantages of our position with your own.

1. δ Cephei. This I have looked at repeatedly with my naked eye, and though I cannot be *sure* that I have seen it double, I put it down, in astronomical language, as "strongly suspected."

2. The two small stars in the neighborhood of the pole-star, and in the general direction, of γ Cephei (thus . P ·.) are seen distinctly, and almost every night, as a single point of light.

3. 4 and 5 ε Lyræ are very beautiful and well defined When lying on my back, the view of these stars, as they have passed near the zenith, has been very similar to that I have often had of Castor in a good telescope. There being *no dew* here, it is almost the universal custom for the people to sleep upon the terraced roofs, which gives them an opportunity, if so disposed, to gaze upon the blue vault above them.

4. α Libræ is seen as two stars in any ordinary state of the atmosphere, as readily as α Capricorni would be in America.

5. Mizar and Alcor in Ursa Major. On looking at these any favorable night, two faint stars, which must be telescopic in England, are distinctly seen. They appear something like this (·80 ζ·).

As I am absorbed in other and pressing labors, which allow me to devote *only an occasional* thought to astronomical pursuits, and as, besides, I *am not furnished* with any first rate instruments, allow me to suggest the great desirableness of some experienced observer's coming here to avail himself of this magnificent climate. One who should spend even a limited period in Oroomiah, might safely promise himself a good, and perhaps a very rich, harvest of astronomical discovery.

The averages of the meteorological register for August, alluded to above, were as follows:

Barometer reduced

Sunrise.	2 P. M.	10 P. M.
24·246	24·247	24·235.

General average..........24·242
Barometer highest.......24·417
" lowest......... ·097
Difference............ ·320

Fahrenheit's Thermometer.

Sunrise	2 P. M.	10 P. M.
67°·4	79°·45	71°·37

General average of the three observations, 72°·41.

Hygrometer—wet bulb.

Sunrise.	2 P. M.	10 P. M.
54°·82	60°·13	55°·37

General average from the above, 56°·87

Average difference of Hygrometer and Thermometer, 15°.87.
" " " " " " at 2 P. M., 19°·02.
Greatest change of Thermometer in 24 hours, 18°.

N. B. The daily observations differ but little from the weekly average. One day follows another with great uniformity.

Letter on the Smithsonion Institution.

BY PROFESSOR AGASSIZ.

Addressed to the Honourable Charles W. Upham.

Dear Sir,—Every scientific man in this country has been watching with intense interest the proceedings of the Smithsonian Institution ever since its foundation, satisfied. as all must be, that upon its prosperity the progress of science in America in a very great measure depends. The controversies which have been lately carried on respecting the management of the Institution have increased the solicitude of its friends with regard to its future prospects in a degree which can hardly be realized by those who are not immediately connected with the cause of science.

As a foreigner, who has enjoyed but for a few years the privilege of adding his small share to support the powerful impulse which scientific investigations have lately received from those who are the native representatives of science in America, I have thus far abstained from taking any part in this discussion, for fear of being charged with meddling with matters in which I have no concern. There is, however, one feature of the institution itself, which may, I trust, justify the step I have taken in addresing you upon this subject as the chairman of the committee elected by the House of Representatives to investigate the proceedings of that establishment.

With the exception of a few indirect allusions, I do not see that any reference is made in the discussion now going on to the indisputable fact that the Smithsonian Institution is *not an American institution*. It was originated by the liberality of a high-minded English gentleman, intrusting his fortune to the United States to found in Washington an institution *to increase and diffuse knowledge among men*. America, in accepting the trust, has obtained the exclusive management of the most important and the most richly endowed scientific institution in the world: but it is at the same time responsible to the scientific world at large for the successful prosecution of the object of the trust, which is to *increase* and *diffuse* knowledge among men.

Were it not for this universal character of the institution, I would not think it becoming in me to offer any suggestion with regard to it As it is, I feel a double interest in its prosperity—in the first place, as an institution designed to foster the progress of science at large, and without reference to nationalities or local interests, and next, as more immediately connected with the advancement of science in the country of my adoption.

The votaries of science may differ in their views about the best means of advancing science, according to the progress they have themselves made in its prosecution; but there is one standard of appreciation which cannot fail to guide rightly those who would form a candid opinion about it. I mean the lives of those who have most extensively contributed in enlarging the boundaries of knowledge.

There are two individuals who may, without qualification, be considered the most prominent scientific men of the nineteenth century—Cuvier and Humboldt. By what means have they given such powerful impulse to science? How have they succeeded not only in increasing the amount of knowledge of their age, but also in founding new branches of science? It is by their own publications and by aiding in the publications of others; by making large collections of specimens and other scientific apparatus, and not by the accumulation of large libraries. Humboldt never owned a book, *not even a copy of his own works*, as I know from his own lips. "He was too poor," he once said to me, "to secure a copy of them;" and all the works he receives constantly from his scientific friends are distributed by him to needy students.

Again, there is hardly a scientific man living on the continent of Europe, who is not indebted to him for some recommendations in the proper quarter for assistance in the publication of their works. I mention more particularly these details about Humboldt, because he is happily still among the living, and his testimony may be asked in a matter of such deep importance to the real progress of science. But the same is equally true of the part Cuvier took in his day in promoting science. All his efforts were constantly turned towards increasing the collection of the *Jardin des Plantes*, and supporting the publication of original researches, giving himself the example of the most untiring activity in publishing his own.

In this connection, I ought not to omit mentioning a circumstance to which the United States owes the legacy of Smithson, which I happen accidentally to know, and which is much to the point, in reference to the controversy concerning the management of the Smithsonian Institution.

Smithson had already made his will, and left his fortune to the Royal Society of London, when certain scientific papers were offered to that learned body for publication. Notwithstanding his efforts to have them published in their transactions, they were refused: upon which he changed his will and made his bequest to the United States. It would be easy to collect in London more minute information upon this occurrence, and should it appear desirable, I think I could put the committee in the way of learning all the circumstances. Nothing seems to me to indicate more plainly what were the testator's views respecting the best means of promoting science than this fact.

I will not deny the great importance of libraries, and no one has felt more keenly the want of an extensive scientific library than I have since I have been in the United States; but, after all, libraries are only tools of a secondary value to those who are really endowed by nature with the power of making original researches, and thus increasing knowledge among men. And though the absence or deficiency of libraries is nowhere so deeply felt as in America, the application of the funds of the Smithsonian Institution to the formation of a library, *beyond the requirements of the daily progress of science*, would only be, in my humble opinion a perversion of the real object of the trust, inasmuch as it would tend to secure facilities only to the comparatively small number of American students who may have the time and means to visit Washington when they wish to consult a library. Such an application of the funds would in fact lessen the ability of the Smithsonian Institution to accomplish its great object, (which is declared by its founder to be the increase and diffusion of knowledge among men.) to the full extent to which they may be spent towards increasing unduly the library.

Moreover, American students have a just claim upon their own country for such local facilities as the accumulation of books affords.

If I am allowed, in conclusion, to state my personal impression respecting the management of the Institution thus far, I would only express my concurrence with the plan of active operations adopted by the regents, which has led to the publication of a series of volumes, equal in scientific value to any production of the same kind issued by learned societies anywhere.

The distribution of the Smithsonian Contributions to Knowledge has already carried the name of the Institution to all parts of the civilized world, and conveyed with them such evidence of the intellectual activity of America as challenges everywhere admiration: a result which could hardly be obtained by applying the resources of the Institution to other purposes.

On Peat and other Vegetable Charcoal and some of its Uses.

BY WILLIAM LONGMAID.*

The subject to which I propose to direct your attention this evening is Charcoal, and some of its uses. The materials forming the earth's surface have been described by geologists and chemists, as consisting of comparatively a few simple substances; and their distribution and uses instructively and beautifully illustrate the power, the wisdom, and the goodness of the Almighty Creator, and furnish unlimited evidence of design.

Of undecomposed substances, probably there is no one that plays more important and varied parts than carbon; if we contemplate the diamond, that beautifies the diadem of royalty, the still more beautiful electric light, or the vast deposits of coal, so extensively distributed in this favoured island, carbon must be regarded as an agent of primary importance.

If we extend our researches to organic beings, we find that with the exception of the framework of animals and the shells of crustacea, carbon forms a moiety of the solid materials of all organic beings, whether animal or vegetable; the beautiful flowers and foliage that adorn the earth, the colours that deck the plumage of the feathered tribes, no less than the tints that clothe the inhabitants of the teeming oceans and rivers, the fragrant perfumes wafted on the gentle breeze, all owe their existence in part to carbon; nay, even some of the solid rocks that form the framework of the great globe itself, are compounded in part of this substance.

However varied in form, and widely-diffused carbon may be in nature, in its countless combinations it is no less useful, in the arts, sciences, and manufactures; indeed, we trace its effects everywhere, in fact, if carbon were to be withdrawn from the earth, organic existence would cease, and the physical condition of the earth itself would be changed.

It may not be amiss, then, to devote a few minutes this evening to the consideration of carbon, in some of its forms and uses, as it is found in the arts and manufactures, particularly under the term vegetable charcoal, the produce of wood and peat.

Charcoal produced from vegetable matter is carbon isolated from the constituents of water, with which it is always combined in organic substances; there are several methods ordinarily employed for this purpose; one in considerable use, is most rude, and no doubt of great antiquity; it consists in digging a pit in the earth, and piling up pieces of wood or peat in large heaps, which are covered with clods of earth in such a manner that the pile may be ignited at the base; when the fire is well kindled, more clods are placed over the pile, in order to prevent the too free access of atmospheric air, and which is eventually excluded; the heap is allowed to stand from one to five or six weeks, the length of time depending on the size of the operation. Another method is much practised in some parts of the Continent, and consists of a furnace somewhat in the form of a kiln, with apparatus to exclude the air; it is filled with the material ignited at the base, and the operation proceeds much in the same manner as before described. Modern science has provided a more perfect operation in destructive distillation in retorts, whereby the volatile products are condensed and are of great practical utility.

In the first method I have described, about 18lbs. of charcoal are obtained from every 100lbs of dry wood; this is considered a fair yield; the other products are mostly lost. In the second method more tar and pitch are obtained with the same quantity of charcoal. But by the more elaborate process of distillation, naphtha, acetic acid, ammonia, and other matters are obtained, together with about 20 to 25 lbs. of charcoal for every hundred pounds of wood.

There is yet a more recent process for the manufacture of vegetable charcoal, for which, jointly with my son, I have obtained letters patent; this process consists in steeping vegetable matter in dilute sulphuric acid, and drying it at a low temperature, whereby we obtain from 40lbs. to 65lbs. of charcoal for every 100lbs. of dry material submitted to the operation.

I presume the experiment I am about to make with sulphuric acid and sugar, has been exhibited in every lecture room in the United Kingdom; this demonstrates the principle of the new mode of manufacturing charcoal, the sulphuric acid has a greater affinity for the elements of water than carbon, and the latter is isolated. We have found that every description of vegetable matter to which we have applied this mode of treatment, has exhibited the same phenomena.

The chemical action that takes place is well understood, and presents no novelty; but the application of this principle to useful purposes, on a large scale, I believe has not before been accomplished; this experiment will demonstrate the nature of the process; this is sawdust of pine timber and has been steeped in sulphuric acid of the strength of 3 degrees of Twaddles hydrometer. I will now place it on this plate, and apply a lamp underneath—we shall soon see the result.

Perhaps it is impossible to over-estimate the importance of charcoal. England is possessed of vast deposits of mineral coal, which enables our manufacturers to produce iron at a cost that bids defiance to all competition. The deposits of coal and iron-stone may be regarded as the foundation of all our greatness as a nation, but whilst the iron is produced in quantities of which the mind can scarcely conceive an adequate idea, and whilst it is of a quality fitted for an endless variety of purposes, for which strength and cheapness are the prime qualifications, it is totally unfit for the manufacture of steel. This circumstance renders this country dependent on foreign countries, chiefly Russia and Sweden, for iron of superior quality. The sole cause of the superiority of foreign iron, is the fact that charcoal is the fuel employed for smelting the ore.

The coke used by the British smelter contains a sensitive amount of sulphur, chiefly in combination with iron, and exists in the coal in the form of iron pyrites; it is found practically impossible, in the great operations of iron smelting, to separate it at a cost that would render it practicable.

On the other hand, charcoal is all but absolutely free from sulphur, and it exists in vegetable matter in the condition of sulphuric acid, and combined with alkali, thus forming a neutral salt, which combines

* Journal Society of Arts.

with the earthy matters of the ore, and thus forms an ingredient of the slag. If from any unforeseen circumstance our supplies of foreign iron should cease, our steel and cutlery manufacturers would be driven to great extremity, and this branch of British industry, of world-wide reputation, would be in danger of considerable derangement.

There are other branches of manufacture dependent on charcoal for their success:—gunpowder and tin-plates: it is also largely used by founders and engineers, and more recently it has been used as a deodoriser, disinfecter, and decoloriser, and also as a manure.

A cursory glance at the position and limited surface of England, with its dense and increasing population, will be sufficient to convince us that space cannot be spared for the growth of timber for fuel; this will be still more evident, if we consider for a moment the consumption of coals in the metropolitan district for the year 1854, which amounted to 3,400,000 tons. The quantity of wood necessary to produce charcoal of equal heating power, would exceed 100,000,000 cubic feet. If we add to the quantity required for London, the quantity required for the consumption of the country and for exportation, we shall find that the entire surface of Great Britain would be inadequate to grow timber sufficient to manufacture charcoal of equal heating power. Whilst this is undoubtedly the case, and with an ever-increasing demand for fuel, attention has been directed to the *bogs* of the United Kingdom, as offering an exhaustless mass of organic matter, ready to be converted by the hand of science into fuel of first-rate quality, eminently suited for most of our manufacturing and domestic purposes.

The extent of bog land in Ireland alone exceeds 3,000,000 acres in surface, in many localities ascertained to be of a depth of 30 feet and upwards.

It is well known that peat charcoal, when employed as fuel for smelting iron, and tempering edge tools, &c., has produced articles of surpassing excellence; it is largely used on the Continent in smelting works, and for domestic purposes.

Peat is vegetable matter undergoing partial decomposition, and probably its formation commenced at a very remote period of the world's history. It is found in natural basins, formed by the inequalities of the earth's surface, wherein the water is dammed up and prevented from flowing into adjacent streams and rivers. In these lakes, vegetable matter has accumulated and is undergoing various changes, and final decomposition. In the earlier deposits it is characterized by a nearly homogeneous structure; but the later and more superficial deposits present a less decomposed, and compacted character, and has the general appearance of an entangled or felted structure, composed of partially decomposed moss and grass, and not unfrequently of shrubs and trees; the moss and grass have the appearance of gradual and successive decomposition at the roots, whilst they continue a vigorous vegetation at the surface.

The entire mass, both of the more compact and the less solid peat, is composed chiefly of ligneous matter, and may be considered as analagous to woody fibre; its quality, however, is frequently affected by the special circumstances of locality. The best samples we have met with have contained, when dried, about 70 to 75 per cent. of carbon, but other samples were contaminated with earthy matters to the extent of 5 to 10 per cent., and we have found some samples of peat charcoal yielding 94 per cent. of fuel.

The attention of the scientific world is now fully awakened to the importance of rendering this vast source of wealth available; not that the coal fields of Great Britain are likely soon to be exhausted, notwithstanding the millions upon millions of tons raised annually, but as a matter of economy in the race of the arts, manufactures, and civilization, it is of first importance to get the greatest possible amount of good at the lowest possible cost. What, then, is the present state of the fuel market? The demand for coke and coals for locomotives, for marine engines, for exportation and other purposes, is so enormous, that the price has been raised to such an extent as to threaten the destruction of extensive industrial operations carried on on the Tyne and in other coal districts. Immense quantities of coke are being sent to the extremities of Great Britian and Ireland, for working the locomotives of the railways, whilst many of the lines traverse vast tracts of bog, capable of being made into fuel, equal in value to coke, and, in such localities, at a third of its cost.

There is another remarkable feature which may be noticed. Ironstone is at this moment being raised in the immediate vicinity of deposits of peat, but in the absence of any economical carbonising process, to render it fit for smelting iron, the ore has to be sent to smelting works, at a considerable charge for carriage. It is a remarkable fact that iron-stone is found constantly occurring in the vicinity of deposits of peat, and when once this treasure is brought fairly to bear, we may anticipate the production of iron of the finest quality.

It may be truly affirmed of Ireland that she contains within her borders all the raw material, except cheapness, to make her a worthy competitor of Great Britain as a manufacturing country; and if once a cheap and practical method be devised of rendering the peat into good charcoal, I can see no end to the prosperity of that country,—abounding, as it does, in rich deposits of iron, copper, lead, and sulphur ores in unlimited quantities, together with rock salt, clay, limestone, slates and granite, having also fine lakes and rivers, the rude materials that form the foundation of a nation's greatness as a manufacturing people. In addition to the mineral deposits, Ireland possesses in her hardy sons the bone and muscle and the energy necessary to raise her to the first rank as a manufacturing nation: and I do not despair of seeing the peat-bog in course of transformation into charcoal, and her idle population become industrious and prosperous manufacturers. I venture to predict, that when the manufacturing capabilities of that country, so rich in native, and at present unappreciated materials, become fully known, capital will flow readily to her aid. But as long as Irish manufacturers have to draw their chief supplies of coal and coke from England and Scotland, her manufactures must languish, and so long will her vast mineral treasures remain undeveloped, and her population be without profitable employment.

The question may arise,—Why is the iron produced by vegetable charcoal of better quality than that by mineral coke? The answer is obvious: iron has an intense affinity for sulphur, and mineral coal contains iron pyrites, a portion of the sulphur of which remains with and injures the texture of the metal smelted by its agency, and renders it unfit for the manufacture of steel, as it is impossible, except at an enormous cost, when once the sulphur has combined with the iron, to make a perfect separation.

Vegetable charcoal also contains some sulphur, but in all cases in a neutral form, combined with potash, soda, or other alkaline re-agents, in this condition it readily combines with the earthy matters of the ore, and forms an ingredient of the slag The peat charcoal we propose to manufacture also contains sulphur, chiefly in the neutral state, as alkaline salts, but a small portion also remains as free acid. In smelting operations the alkaline sulphates combine with the earthy matters of the ore, forming slag, and the free sulphuric acid is decomposed.—One atom of the oxygen of the acid combines with an atom of carbon, forming carbonic oxide, and liberating the remaining oxygen and the sulphur as sulphurous acid; thus all the sulphur of the free sulphuric acid is evolved into the atmosphere.

In pit coal the sulphur exists in varying quantities, from one to fifteen per cent. When it exists in larger quantity than two or three per cent. it renders the coal unfit for many manufacturing purposes.

There is another quality of fuel of great importance, its heating power. The following table is an extract from Dr. Ure's work, and may be regarded as the mean results of numerous experiments made by that gentleman. It gives the quantity of water raised from the freezing to the boiling point, and the quantity of water of the temperature of 212°, evaporated by the combustion of one pound of fuel in each case:—

	Pounds of water raised from 32 to 212 degrees.	Water at 212° evaporated.
	lbs.	
Perfectly dry wood	35	6·36
Wood in its ordinary state	26	4·72
Do. charcoal	73	13·27
Pit-coal	60	10·90
Coke	65	11·81
Peat	30	5·45
Peat charcoal	64	11·63

It will be seen from the above table that wood charcoal stands first in heating power, coke second, and peat charcoal within 1·3 per cent. equal to coke.

Charcoal has also the peculiar faculty of absorbing watery vapour and gases to an extraordinary extent. Professor Liebig states the result of experiments conducted by Saussure, that one volume of charcoal in 24 to 36 hours absorbed 90 volumes of ammoniacal gas, 65 sulphurous acid, and 55 of sulphuretted hydrogen. It also absorbs nitrogen and many other gases. This property of charcoal has of late been turned to practical account, as it has been used as a disinfecter, and deodoriser, some interesting particulars of which will be found in a paper read to this Society by Dr. Stenhouse, in the early part of last year.* Since that period experiments have been made by Mr. Barford, at Bartholomew's Hospital. The particulars were published in the *Lancet* a few weeks since. The writer, after describing the substances possessing the property of deodorising and disinfecting, and the chemical action on which they respectively depend, and also pointing out their several defects, adds, that they are all open to serious objections: but the one which practically will be found the most effectual, I believe, has received the least patronage. This is charcoal, a body whose disinfecting powers have long been known, but its mode of application has been quite neglected. A most perfect trial has been made in the dissecting rooms of St. Bartholomew's Hospital, which must abound in noxious gases and putrescent odours. On thoroughly heating the charcoal and placing it in shallow vessels about the rooms, it acted so promptly, that in ten minutes not the least diffused smell could be detected. So quick and effectual was its action, that arrangements have been made for its constant use. As a purifier of hospital wards, both civil and military, it might be applied with great advantage, saving patients from the unpleasant smells and effluvia from gangrenous wounds; thus the patient himself and those in adjacent beds, would not be subjected to the influence of putrescent odours. All these the charcoal would effectually absorb. Charcoal is more efficacious than any other disinfectant when applied in the manner described, absorbing gases of every kind. It does not require the presence of any other substance to assist its action, but without stint or scruple collects noxious vapours from every source, not disguising, but condensing and oxydising the most offensive gases and poisonous effluvia, converting them into simple, inert, stable compounds. It is easy of application, and is economical, comes within the reach of the poorest, and can be safely placed in the hands of the most ignorant, thus combining advantages not possessed by any other disinfectant.

Mr. Barford also described a process for purifying the charcoal, so as to renew its powers, but this need not be practised, for the charcoal after being used in the hospitals, is more valuable as a manure, by reason of the gases it has absorbed: thus its use need not entail any expense on such establishments. This brings us to the consideration of charcoal as a manure, for which purpose it is likely to become an important agent, especially from the circumstance of its possessing such intense affinity for nitrogenous gases and aqueous vapour.

Professor Liebig states that peat and spent bark are most difficult forms of organic matter to deal with as manure; that peaty matter remains for years exposed to the influence of air and water without undergoing change, and in this state yields little or no nutriment to plants. Recent experience has, however, shown that when organic matters, such as peat and spent tan, are converted into charcoal, they become exceedingly valuable as vehicles for the transmission of water, nitrogenous compounds, carbonic acid, &c., to the plants, first separating these matters from the atmosphere, and again yielding them up when required.

The mode of applying charcoal as manure is simple; it should be ground to a coarse powder, and then strewn over farm yards, manure heaps, stables, cow-houses, pig-styes, cess-pools, or placed in manure tanks, urinals, &c.

It is suitable for being applied, also, without mixture by the drill or broad cast, in the proportion of 4 to 7 cwt. per acre, to all green and corn crops, and will be found a valuable addition to most soils, especially those which are composed of clay.

Perhaps I may be permitted to make a short digression, for the purpose of introducing to your notice another preparation of peat; this is peat manure produced by steeping the peat fresh from the bog in a solution of caustic alkali; it is then dried and ground.

Contrary to the general opinion of writers on agricultural chemistry, that the atmosphere and water are the sources from whence vegetables derive their carbon, I entertain the opinion, that they would at all times take up a large proportion of their carbon by the roots, whenever it is presented in soluble compounds, such as organic matters dissolved by means of alkalies, in which condition it has been found, by actual experiment, that growing plants do take up and assimilate the carbon of such compounds, when they are applied in a suitable form.

In the substance I have now the honour of submitting to your notice, a very large portion of the inert peaty matter, described by Liebig, as being so difficult of treatment and slow of change, is rendered soluble by the process I have described; not only so, but the remaining organic matters are in a condition to undergo rapid change. We have in this powder from 50 to 60 per cent. of organic matter combined with salts of soda, and nitrogenous compounds soluble in water, this, surely, cannot fail to become a most important addition to our list of artificial manures. Sea-weed treated in the same manner yields still more remarkable results.

Trusting to be excused for this digression, I will return to the subject of charcoal. Some of the sawdust charcoal, of which a sample is on the table, has been manufactured into gunpowder of a very fine quality, but strange to say, there is little probability of its being generally used by powder manufacturers. With one honourable exception, all those whose attention I have called to this article, have declined to use it, or to adopt sawdust as a material for the manufacture of charcoal. One firm informed me that they never introduce any novelty until it has been fully approved by the Government; another used only elder; others restrict themselves to oak, willow, or dog wood, for the manufacture of charcoal, each firm enjoying the opinion that no other wood is fit for making powder of superior quality but the special kind they individually use; and then, why should they make any alteration for their fathers and grandfathers did the same before them. This will serve to show the difficulty that sometimes exists in introducing novelties, and getting them adopted by established manufacturers.

In conclusion, I trust I have furnished you with some points for discussion, which I consider the principal object of this paper.

Should it be my lot, in the ordering of an All-wise Providence, to be made the humble instrument of developing the resources of our bogs, and other unapplied and unappreciated products, to assist in raising the people of Ireland to a just appreciation of the vast mines of wealth that abound in their favoured land, it will be a source of satisfaction to me to the latest period of my life, independent of any pecuniary advantage I may derive.

* *Vide* "Journal of the Society of Arts," Vol. ii. p. 245.

CANADIAN INSTITUTE—SESSION 1854-55.

Eleventh Ordinary Meeting—March 3rd, 1855.

The name of the following candidate for membership was read:—

J. W. Dunbar Moodie .... County of Hastings.

The following gentlemen were elected members:—

D. L. Macpherson .... Toronto.
Patrick Macgregor .... "
Alexander Grant .... "
Alexander Logie .... Hamilton.
James Dunbar Pringle .... "
Thos. S. Hunt .... Montreal.

The following donations were announced from the Hon. J. M. Brodhead, Washington:—

1. Foster and Whitney's Report on the Geology of the Lake Superior Land District. Part II. The Iron District, with Maps.

2. Constitution of the United States of America, with other Political Documents and Statistical Information, completed by W. Hickey.

3. Patent Office Report for the year 1852. Part II. Agriculture

4. Patent Office Report for the year 1853. Part II. Agriculture.
5. Patent Office Report for the year 1849-50. Agriculture.
6. Patent Office Report for the year 1849-50. Mechanical.

The thanks of the Institute were ordered to be conveyed to Mr. Brodhead.

A Paper was read by the Rev. Professor Hincks "On the Classification of Birds."

Twelfth Ordinary Meeting--March 10th, 1855.

The names of the following candidates for membership were read:—

Augustus Nanton .... Toronto.
William Couper.................................... "

The following gentleman was elected member:—

J. W. Dunbar Moodie.............................. County of Hastings.

The following donation was announced:

"The Origin and Progress of the Mechanical Inventions of James Watt," by James P. Muirhead, M.A., 3 vols. Presented by George Wilson, jun., New York.

A communication on the subject of "Spurious Mexican Coins," was made by Professor Croft.

A paper "On the Indian Tribes of Canada," by the Rev. W. Bleasdell, M.A., was read.

A communication from Major Lachlan, Montreal, "On the Union of Lakes Erie and St. Clair," was read by the Secretary.

Thirteenth Ordinary Meeting--March 17th, 1855.

The following gentlemen were elected members:—

Augustus Nanton.................................. Toronto.
William Couper.................................... "

A Paper "*On Railway Truss Bridges,*" by *T. C. Clarke, C.E.,* was read by Sandford Fleming, C.E.

Professor Croft made some observations on a specimen of Bitumen from the Western District.

Professor Chapman described a convenient method of tabulating the organic remains found in different strata.

Fourteenth Ordinary Meeting--March 24th, 1855.

The names of the following candidates for membership were read:—

John Macpherson Hamilton...................... Toronto.
William Dixon .... "
Theodore Bown .... Hamilton.
R. James Johnston.................................. Thorold.
William H. Lambe.................................. Montreal.
Frederick W. Torrance .... "
Hon. John Young .... "

The Vice-President announced the receipt of several numbers of the "Boston Journal of Natural History," laid on the table by Mr. Ure.

It was resolved "that the Canadian Institute, in returning their thanks to the Natural History Society of Boston, for their kindness in forwarding three parts of the sixth volume of their Journal, and several sheets of their Transactions, desire at the same time to express their readiness to transmit the "Canadian Journal" in exchange."

A Paper "On the Origin of the Basins of the Great American Lakes," was read by Professor Hind.

LITERARY AND HISTORICAL SOCIETY OF QUEBEC.

LITERARY OR STATED MEETING.

WEDNESDAY, 7TH FEBRUARY, 1855.

The following donations were announced, viz.:—

"Kugler's Handbook of Painting," edited by Sir E. W. Head, presented by the Governor General.

"Abstract of Meteorological Observations made at the Magnetic Observatory at Toronto, from January, 1840, to June, 1853."

"Geological Map of Canada," and a "Table giving the five-day *Means of the Temperature of Toronto, from twelve years'* observation," presented by E. A. Meredith, Esq., LL.B.

"Statement of Vessels arrived at the Port of Quebec in each year, from 1764 to 1854 inclusive, with their Tonnage and Number of Men," presented by the Hon. Henry Black, Q.C.

"Proceedings of the Royal Society, Vol. 7, No. 3," presented by Lieutenant Noble, R.A., F.R.A.S.

The thanks of the Society were ordered to be given to His Excellency and the other gentlemen above-named, for their respective donations.

The Hon. John A. Macdonald, Attorney General for Upper Canada, and F. T. Roche, Esq., were proposed as Associate Members.

Lieut. Noble, R.A., F.R.A.S., communicated to the Society, at the request of Lieut. Rankin, R.E., a Formula for ascertaining the height of mountains, which that gentleman states has been recently submitted to the scientific world in Edinburgh:—

$$h = 517\ t + t^2,$$

where h is the height of mountain in feet, t the difference between temperature at which water boils at summit and base of mountain.

The thanks of the Society were ordered to be given to Lieut Rankin, R.E. for his interesting communication.

A Paper was read by Lieut. H. G. Savage, R.E., on the "History of British Poetry."

The thanks of the Society were ordered to be given to Lieut. H. G. Savage, R.E., for his Paper, which was referred to the Class of Literature.

MONTHLY GENERAL MEETING.

WEDNESDAY, 14TH FEBRUARY, 1855.

A donation was announced of "A Copy of Meteorological Observations, made at the Magnetic Observatory at Madras, in the years 1846 and 1850," from the Court of Directors of the Hon. East India Company.

The thanks of the Society were ordered to be given to the Court of Directors for their donation.

The 21st of February being Ash-Wednesday, no stated meeting of the Society was held.

HENRY E. STEELE,
Recording Secretary.

Brief History of the Catawba Grape.

The Catawba grape, according to the *Home Journal,* was first discovered near Asheville, in Buncombe county, North Carolina, in the southwest corner of the State, near the head waters of the Catawba River. It was found by a Mr. Murray, about the year 1801; the grapes were growing wild in the woods in the greatest profusion. General Davy, a Senator in Congress, living at Rocky Mount, on the Catawba River, transplanted some of these grapes to his residence, and from thence took a few plants with him to Washington during the period of his senatorship—some time prior to 1816. From or through him the distinguished Major Adlum obtained some of the plants, and was the first person who made wine from them—about 1822. In 1823 he sent some of the plants, with specimens of the wine, to Mr. Longworth, of Cincinnati, to whom we are thus indebted for its first introduction in the West.

There are several other varieties of native grapes from which small quanities of wine are made, but they are generally inferior in many respects to the Catawba; from the wine of this grape, which has undergone simple fermentation, is made the celebrated "sparkling wine," first introduced to the world at Cincinnati, in whose vicinity there is at the present time near fifteen hundred acres in cultivation, producing an average yield of three hundred gallons to the acre; during the past season some have realized as high as five hundred, seven hundred, eight hundred, and eight hundred and fifty gallons to the acre.

The success in producing wine from this grape is in some measure to be attributed to the greater length of the seasons and the character of the soil in this vicinity. It being absolutely necessary to make wine from this or any other grape, that it should reach the degree of ripeness or maturity which will furnish the requisite amount of sugar or saccharine matter to preserve the wine by its conversion into alcohol in the process of fermentation. Grapes may be considered ripe enough for eating, which would not do for wine making.

Substitutes for Citric and Tartaric Acids, and their Salts.

Gatty and Kopp employ lactic acid and the lactates. This acid, when used as a resist, is thickened with starch, and then printed by block or roller upon cloth, which is afterwards printed or padded with mordants. One gallon lactic acid at 40° Twaddle is used, instead of one gallon lemon-juice at 50° Twaddle. In cases where the lemon-juice is previously saturated with an alkali, the lactic acid is treated in the same manner.

When lactic acid is used as a discharge, it is thickened as in the above case, and printed upon cloth saturated with mordants, which it discharges by forming soluble salts with the oxides constituting the mordants. In using lactic acid to precipitate carthamine from the alkaline solution of safflower, 4 lbs. acid at about 40° Twaddle are used in place of 3 lbs. tartaric acid. In dyeing Prussian blue, scarlet, crimson, &c., on silk or wool, tartaric acid or cream of tartar is generally used. In such cases, lactic acid or bilactate of soda is applied, and the manipulations are the same as when tartaric acid is used, 1¼ lbs. bilactate of soda at 66° Twaddle serving for 1 lb. cream of tartar. When lactic acid is employed for steam colours, it is substituted for tartaric acid in the proportions already stated, the preparations of the colours being the same as when tartaric acid is used. Lactic acid may be applied in preparing white and coloured discharges upon Turkey red and other colours: the operation is managed just as if tartaric acid were used—only, after printing, the cloth should not be exposed to a long-continued heat, which, owing to a slight volatilization of the lactic acid, would reduce its discharging properties.

Belford's process depends upon the formation of an artificial tartaric acid by mixing oxalic acid with sugar, a substance containing the exact proportion of hydrogen in which oxalic acid is deficient. A quantity of sugar or treacle is drenched with nitric acid, and with some mother-water in which oxalic acid has been crystallised. As soon as nitrous vapours cease ascending, more nitric acid is added, and the solution is then concentrated until a crystalline mass is obtained on cooling. This mass consists of slender crystalline needles, and is next washed for obtaining the acid. After washing the crystals, add sugar which has been dissolved in some of the washing liquor, the quantity of sugar required being proportional to the degree of acidity which it is desired to attain. The syrupy fluid is then concentrated at a gentle heat, and left to crystallise at a moderate temperature. Or, take one part of sugar or treacle, and add one-third acetic acid, and three parts nitric acid at 36° Twaddle. This yields an oxalic acid containing more hydrogen than the common oxalic acid (?!). The crystals obtained from this solution are purified by washing and re-crystallisation. The oxalic acid thus obtained may be converted into tartaric acid by deoxidisation. This is effected by dissolving sugar in the washing liquor and mixing with the acid. The solutions, when concentrated at a low temperature and crystallised, yield so-called "tartaric" acid. The wash liquors when concentrated may be used as mordants.

Murdock substitutes for cream of tartar, and for the mixture of cream of tartar with alum, common salt with nitric acid, and sulphate of alumina. 100 lbs. salt are mixed with 300 lbs. of water, and when dissolved, 20 lbs. nitric acid are introduced. When alum is required, 100 lbs. sulphate of alumina are gradually added. The water should be cold, and the mixture but slightly stirred.

Canadian Marble.

We have been favoured with some hand specimens of different varieties of marble from the quarries of Messrs. Nicholls & Co., in the township of Marmora. The marble is within two feet of the surface of the ground. The river Moira runs across the corner of the lot on which the quarry is situated, and offers available power for the requisite machinery in a marble manufactory. The distance of these quarries from Cobourg is about 50 miles, and from Belleville nearly 30 miles. From the circumstance of their proximity to the Marmora iron works, it is probable that the distance from a port will not long continue to be a serious obstacle against the general adoption of Canadian marble for ornamental and useful purposes. It is not generally known that a large supply of very good marble can be obtained from many parts of Canada. Notices of localities where marble may be procured are interspersed throughout the Reports of the Geological Commission:—Mr. Logan says that, some beds of the Chazy limestone in the neighbourhood of Montreal are known to take a moderately good polish, and they are cut into slabs for the purpose of chimney-pieces, and occasionally for tables, one of which, manufactured by Mr. Hammond of Montreal, and sent to the London Industrial Exhibition of 1851, attracted attention, and was readily sold. The colour of these slabs is a dark grey; in some parts of the district the grey shews occasional spots of red, as on Madame Nolan's farm at Ste.-Catharine, and on Isle-Bizard; but in seigniory of La-Chenaye, on the Little River, about a mile from St.-Lin, massive beds of the formation become almost wholly red, and give large slabs of a very handsome aspect. The beds are composed of a mass of comminuted organic remains, consisting of shells and corals, the latter predominating, and the prevailing species being *Chætetes lycoperdon*. The corals are coloured ochre-red, while some of the shells approach rather a rose-red, and parts of the stone are mottled with a greyish-red running irregularly over the surface. A large supply of this marble might easily be procured.

On the Separation of Silver from Lead.—At a meeting of the Royal Cornwall Polytechnic Institute, Mr J. A. Phillips, of London (formerly of the Museum of Economic Geology), said that one of the most important improvements which had recently been made in the metallurgical art came into operation last year, and is the separation of silver from lead by means of zinc. After describing the old process of separation, and the subsequent process discovered by Mr. Pattinson, of Newcastle-on-Tyne, involving several crystallisations and a final cupilation, he stated that still more recently a patent had been taken out by Mr Parkes for a process by which he separates the silver entirely by one operation. To do this, the alloy of silver and lead is melted in the usual way in a large iron pot: to this a small quantity, a few pounds of zinc per ton, is added, the whole mixed up and allowed to remain a short time. By this means the silver is brought to the surface in the form of alloy with the zinc, and this mixture is subsequently skimmed off and treated for the silver it contains. In order to do this, the zinc is first partially separated by oxidation, and the residual alloys afterwards treated in the cupel. In connexion with the purification of metals, he might mention some of his own experiments in regard to tin. The tin from Peru and some other countries contains a large amount of tungstan, or wolfram, which very much depreciates its value. Till recently this tin could only be employed for very common purposes, such as making tin pipes and other things which did not require tin of good quality. But in analysing some of this tin he happened to discover a process by which the separation was very easily effected, and this process had been recently patented. It consists in taking impure tin, containing from 5 to 10 per cent. of tungstan (worth £25 per ton less than tin of ordinary purity), granulating it by melting it in a reverberatory furnace, and allowing it to flow into a vessel containing water. This granulated tin is then placed in a pan with common hydrochloric acid, which may be obtained from the soda manufacturers at almost a nominal price. This being heated, hydrogen gas is evolved, and a solution of chloride of tin is obtained. In this operation it is necessary that the tin should be present in excess; unless it be so, a certain portion of tungstan be dissolved. Should, however, the operation be carried on too far, and a portion of tungstan will be dissolved, the addition of a small quantity of impure tin precipitates the tungstan, and chloride of tin, free from tungstan, is obtained. This is turned off into a vat, in which more granulated impure tin is placed, and any arsenic or antimony remaining is there deposited, and a pure solution of chloride of tin obtained. From this we have to get the chemically pure tin we require, and which is quite as good as the stream tin of Cornwall. Into this bath we put bars of metallic zinc, which precipitates the tin in a spongy mass, when instead of chloride of tin we get chloride of zinc. The tin thus produced may be fused into bars, or sold as the best tin. The chloride of zinc must be so used as to lower the expense of the whole process. To do this, it is precipitated by milk of lime, or common chalk; we then get oxide of zinc, which is largely used as a pigment; and to give it sufficient opaqueness for that purpose, the washed oxide of zinc is heated to redness, when it is found to be equal to the ordinary oxide of zinc obtained by sublimation.

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

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

Day.	Barom. at temp. of 32 deg. 6 A.M.	2 P.M.	10 P.M.	Mean.	Temp. of the Air. 6 A.M.	2 P.M.	10 P.M.	M'N.	Mean Temp. + or — of the Average	Tension of Vapour. 6 A.M.	2 P.M.	10 P.M.	M'N	Humid'y of Air. 6 A.M	2 P.M	10 P.M	M'N	Wind. 6 A.M.	2 P.M.	10 P.M.	Mean Vel'y	Rain in Inch	Snow in Inch.
1	29·596	29·458	29·510	29·524	15·4	25·4	—1·4	12·3	—11·6	0·080	0·108	0·034	0·070	·87	·78	·71	·78	Calm	W	Calm	7·17	...	0 5
2	·335	·263	·195	·260	8 6	21·7	20·5	17·1	— 6·8	·058	·088	·098	·080	83	71	86	80	W S W	W S W	W	11·40	...	0·4
3	·264	·314	·391	·350	4·8	14·8	7·5	8·1	—15·6	·050	·066	·011	·052	85	73	66	75	W	W	W S W	13·97	...	0·5
4	·513	·425	—	—	—11·0	1·7	—	—	—	·021	·038	—	—	75	75	—	—	N b E	Calm	Calm	4·13	...	0·3
5	·356	·316	·686	·457	—9·0	6·6	—15·1	—7·6	—31·2	·019	·048	·010	·025	61	75	41	66	N N W	W N W	N	8·27	...	0·1
6	·763	·746	·763	·753	—24·2	—10·4	—10·6	—14·4	—37·9	·007	·020	·027	·023	45	65	91	68	N N E	NE b N	NE b N	9·19	...	2·5
7	·686	·527	·416	·546	—9·8	2·5	6·1	—0·3	—23·7	·023	·042	·058	·043	77	80	92	85	N E b N	N E	N E	13.21	...	2·5
8	·181	·455	·196	·481	5·0	15·6	13·8	11·1	—12·3	·054	·066	·081	·063	90	71	93	80	N b E	N b E	N b W	6·92	...	0·1
9	·196	·560	·692	·591	11·5	18·0	—2·5	9·3	—14·0	·069	·088	·031	·061	89	85	84	84	N b W	W N W	N N W	3·52	...	Inap.
10	·730	·716	·631	·691	10·7	23·3	19·0	17·7	— 5·6	·064	·088	·092	·082	83	69	85	80	Calm	S W b W	S W b S	6·06	...	4·0
11	·467	·551	—	—	19·4	28·7	—	—	—	·075	·099	—	—	68	62	—	—	S	Calm	Calm	2·07	...	...
12	·819	·764	·696	·759	14·4	28·7	28·7	14·2	+ 0·9	·076	·146	·145	·118	86	92	92	87	N b E	E S E	E b S	11·11	...	5·0
13	·624	·592	·505	·571	31·2	35·0	34·1	33·5	+10·3	·160	·168	·195	·175	92	83	99	92	E S E	E b N	E b N	12·36	1 705	...
14	·433	·451	·545	·480	34·8	36·2	33·9	34·8	+11·6	·199	·207	·179	·193	99	98	93	96	E N E	N N E	Calm	2·44	0·065	...
15	·526	·469	·441	·473	31·2	37·3	31·6	33·1	+ 9·8	·161	·193	·162	·171	91	87	92	91	S W b S	N W	N W	6·65	...	4·0
16	·359	·402	·488	·423	28·4	32·7	29·1	28·6	+ 5·2	·142	·161	·149	·143	90	89	94	90	N W b W	W S W	W	4·86	...	1·5
17	·526	·553	·611	·567	23·7	32·1	26·6	26·8	+ 3·5	·113	·157	·130	·130	86	87	89	87	W S W	W	W N W	5·51	...	0·2
18	·622	·612	—	—	25·2	34 1	—	—	—	·123	·162	—	—	89	82	—	—	W	N W	N W b N	11·50	...	*Inap.*
19	·694	·685	·754	·717	22·6	28·4	24·1	23·9	+ 0·4	·107	·139	·115	·114	85	89	86	86	N W b N	N N W	N N W	13·95	...	0·2
20	·830	·870	·965	·910	19·7	31·2	19·9	23·1	— 0·5	·094	·129	·081	·100	85	75	73	78	N N W	N W b N	N W	8·83	...	...
21	·991	·962	·859	·936	14·8	33·5	15·4	20·8	— 3·0	·078	·130	·064	·090	86	69	68	75	W N W	S W b S	S W b S	1·95	...	...
22	·696	·650	·776	·712	26·2	33·3	21·4	26·5	+ 2·6	·132	·144	·120	·126	91	75	89	86	S W	N W b W	N b W	11·76	...	...
23	·834	·831	·858	·843	5·0	11·6	0·7	4·6	—19·3	·043	·053	·032	·041	73	67	65	69	N	N N W	N N W	7·77	...	...
24	·858	·774	·776	·797	—6·4	13·6	—1·4	2·3	—21·9	·027	·067	·037	·042	76	77	84	75	W N W	W b N	W b N	6·90	...	...
25	·676	·522	—	—	—8·2	13·1	—	—	—	·024	·045	—	—	71	53	—	—	W b S	W	W	12·66	...	...
26	·443	·382	·463	·435	6·1	16·3	13·3	11·7	—12·8	·043	·060	·069	·058	70	63	81	73	W b N	W b N	W	12·75	...	Inap.
27	·536	·679	·829	·705	11·5	17·2	6·1	11·3	—13·4	·068	·069	·047	·059	86	69	76	75	N N W	N W b W	N N W	8·87	...	...
28	·928	30·002	30·076	30·011	1·5	20·8	10·1	11·4	—13·5	·040	·050	·059	·051	80	44	80	67	W b N	N N E	W N W	2·65	...	...
																		Miles.	Miles.	Miles.	Miles		
M	29·617	29·602	29·614	29·625	11·6	21·9	13·9	15·1	— 8·3	0·080	0·101	0·086	0·088	·83	76	82	·80	6 19	10·14	8·56	8·17	1·770	21·8

Highest Barometer...... 30·088, at 12 p.m. on 28th } Monthly range:
Lowest Barometer....... 29·172, at 12 p.m. on 2nd } 0·916 inches.
Highest registered temperature +39° 0, at p.m., 15th } Monthly range:
Lowest registered temperature —25°·4, at a.m. on 6th } 64° 4.
Mean Maximum Thermometer............. 23°·19 } Mean daily range:
Mean Minimum Thermometer....... ...... 4°·81 } 18° 38.
Greatest daily range.........34°·2, from p.m. of 5th to a.m. of 6th.
Least daily range .... 5°·9, from p.m. of 13th, to a.m. of 14th.
Warmest day....... 14th. Mean temperature......+34° 83 } Difference,
Coldest day......... 6th. Mean temperature......—14° 38 } 49°·21.
Greatest intensity of Solar Radiation, +60° 5 on p.m. of 15th } Range,
Lowest point of Terrestrial Radiation, —31°·0 on a. m. of 6th } 91°·5.
Aurora observed on 4 night: viz. 9th, 11th, 20th, and 21st.
Possible to see Aurora on 12 nights. Impossible on 16 nights.
Raining on 2 days. Raining 20·5 hours: depth, 1·770 inches.
Snowing on 14 days. Snowing 98·0 hours; depth 21·8 inches.
Mean of Cloudiness, 0 71.

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

North—2713·64 West—2786·04 South.—463·75 East—937·49.
Mean direction of the Wind, N 37° W.
Mean velocity of the Wind, 8·17 miles per hour.
Maximum velocity, 25·0 miles per hour, from 3.30 to 4.30 p.m. on 1st.
Most windy day, the 3d; mean velocity, 13·97 miles per hour.
Least windy day, the 21st; mean velocity, 1·95 " "
Most windy hour, 9 p.m. Mean velocity, 10·45 miles per hour.
Least windy hour, 4 a.m. Mean velocity, 5·92 miles per hour.
Mean diurnal variation, 4·53 miles.

The mean temperature of this month has been 7°·7 below the average, being the coldest month during the 16 years, with the single exception of February, 1843. The minimum temperature, —25°·4, is the lowest on record; the nearest approach to it being —18°·4, which occurred on January 16th, 1840.

The first ten days of the month were remarkable for a continuance of extreme cold, the fifth and sixth days (—7°·6 and —14°4) being the coldest yet recorded, the next coldest day of the whole series being Jan 10th, 1848, the mean temperature of which was —5° 3 The range of temperature on the whole month has been very great (64°·4), and has only once been surpassed, namely, in April, 1842, in which month the extreme range (69°7) was caused by an unusually high temperature for the season (89°·8), supposed to be occasioned by a fire in the western woods. The barometer has been remarkably steady during the month, and high winds have been prevalent, though without attaining extreme violence. The velocity of the wind for the whole month is not only the greatest for any February yet recorded, but absolutely the highest for the eight years, with the single exception of December, 1854.

23d, at 7 a.m.—Segment of halo round the sun, and very bright Parhelion on the south side of the halo.

Comparative Table for February.

Year.	Temperature Mean.	Dif. from Av'ge	Min. obs'vd	Max. obs'vd	Range	Rain. D's.	Inch.	Snow. D's.	Inch.	Mean M Velocity.	
1840	28·0	+4·9	— 8·3	49·1	57·4	8	1·475	6	...	...	
1841	22·4	—0·7	— 0·3	43·4	43·7	1	0·000	9	...	0·61	lb.
1842	26·9	+3·8	+ 2·5	48·7	46·2	8	3·625	9	...	1·03	lb.
1843	14·5	—8·6	—10·2	37.5	47·7	1	0·475	21	14·4	1·05	lb.
1844	26·0	+2·9	— 0·4	47·1	47·5	4	0 130	7	10·0	0·43	lb.
1845	26·0	+2·9	— 3·9	46·6	50·5	5	Impf.	9	19·0	0·99	lb.
1846	20·4	—2·7	—16·2	41·4	57·6	0	0·000	13	46·1	0·65	lb.
1847	21·5	—1·6	— 1·0	42·2	43·2	2	0·550	13	27·3	0·69	lb.
1848	26·6	+3·5	— 0·6	46·9	47·5	4	0·775	8	10·8	5·69	Miles.
1849	19 5	—3·6	— 9·2	41·1	50·3	2	0.240	13	19·2	6·58	Miles.
1850	26·0	+2 9	+ 1·3	49·2	47·9	7	1·235	9	23·1	7·61	Miles.
1851	27·6	+4·5	+ 1·3	50·2	48·9	7	2·600	4	2·4	6·94	Miles.
1852	23·4	+0 3	— 3·2	4_ 2	44·4	3	0·650	11	13·0	6·42	Miles.
1853	24·1	+1·0	— 0·6	43·4	44·0	4	1·030	15	12·6	7·29	Miles.
1854	21·1	—2·0	— 5·7	42·7	48·4	5	1·460	15	18·0	6·91	Miles.
1855	15·4	—7·7	—25·0	37·3	62·3	2	1·770	14	21·8	8·17	Miles.
										0·78	lbs.
M'n.	23.09		—4·97	44·25	49·22	3·9	1·088	11.0	18·3	6·95	Miles.

NINE MILES WEST OF MONTREAL.

BY CHARLES SMALLWOOD, M.D.

Latitude—45 deg. 32 min. North. Longitude—73 deg. 36 min. West. Height above the Level of the Sea—118 Feet.

Day.	Barom. corrected and reduced to 32° Fahr.			Temp. of the Air.			Tension of Vapor.			Humidity of Air.			Direction of Wind.			Velocity in Miles per Hour.			Rain in Inch.	Snow in Inch.	Weather, &c. A cloudy sky is represented by 10: A cloudless sky by 0.		
	6 A.M.	2 P.M.	10 P.M.	6 A.M.	2 P.M.	10 P.M.	6 A.M.	2 P.M.	10. P.M.	6 A.M.	2 P.M.	10 P.M.	6 A.M.	2 P. M.	10 P.M.	6 A.M.	2 P.M.	10 P.M.			6 A.M.	2 P.M.	10 P.M.
1	29·840	29·750	29·598	- 7·9	17·0	9·0	·028	·095	·067	·80	·93	·90	S W b W	S b W	S b W	2·02	0·78	0·57	...	...	Clear.	Cir. Cum. 4.	Cir. Cum. 4.
2	·595	·500	·510	- 7·0	21·0	16·1	029	112	091	83	95	94	S S W	S W b W	S W	5·25	9·00	6·42	...	Inap.	Do.	Snow.	Cum. 4.
3	·400	·187	·514	- 4·0	15·6	9·0	036	088	067	86	93	94	W N W	W	W b N	0·22	5·52	6·32	...	...	Hoar Frost.	Cir.Cum.Str.4	Cir. Str. 4.
4	·654	·698	·700	-14·8	-10·3	-22·3	021	028	015	83	90	88	W b N	W	N W	13·37	9·30	3·86	...	...	Clear.	Clear.	Clear.
5	·516	·590	·710	-26·1	- 5·5	-20·0	008	034	015	49	84	79	N E b N	N E b N	N W b W	6·52	2·86	1·65	...	...	Do.	Do.	Do.
6	·881	·991	30·046	-32·6	-18·6	-24·5	007	014	014	68	66	87	N W	S W	S W	5·65	Calm	0·25	...	...	Do.	Do.	Do.
7	30·069	30·061	29·936	-33·9	- 6·2	-11·0	003	029	026	29	80	92	E b N	N E b E	N E b E	2·57	0·40	4·47	...	...	Do.	Do.	Do.
8	29·806	29·790	·860	- 5·1	5·5	8·3	031	058	065	80	90	92	N E b E	N E b E	N E b E	1·12	1.21	18·77	...	Inap.	Str. 10.	Slight snow.	Str. 10.
9	29·724	·740	·780	8·2	16·3	12·1	058	077	076	82	73	90	N E b N	N E	N E b N	16·25	7·50	3·22	...	...	Do. 10.	Str. 10.	Do. 10.
10	·900	·987	·940	10·1	22·4	14·0	069	113	083	93	87	90	W b N	S W b W	S W b S	Inap.	1·30	0·90	...	...	Cir. Str 4.	Cum. Str. 10	Do. 10.
11	·850	·818	·941	12·4	29·2	7·5	080	161	062	83	89	93	S E	S E b E	W N W	0·40	0·52	Calm	...	...	Str. 2.	Do. 4.	Cl'r Auro.Bor.
12	30·025	30·212	30·214	- 3·0	24·5	4·7	041	127	056	95	85	95	W N W	S W b S	E N E	Inap.	Calm	Calm	...	...	Cir. Str. 10.	Cum. 4.	Do. do.
13	30·200	30·161	30·156	13·0	20·4	16·3	090	101	087	88	77	78	N E b E	N E b E	N E b E	1·58	4·32	5·00	...	...	Str. 10.	Str. 10.	Do. do.
14	30·120	30·051	30·041	16·0	30·9	30·6	098	171	178	88	89	92	N E b E	N E b E	E N E	8·76	0·67	9·44	...	6·70	Sleet.	Snow.	Snow.
15	29·912	29·810	29·795	30·4	32·2	32·0	176	191	199	91	95	1·00	N E b E	N E b E	N E b E	11·63	7·50	2·50	...	2·80	Str. 10.	Str. 10.	Snow.
16	·730	·700	·730	31·8	38·7	33·1	192	196	197	99	77	91	N E b E	N E b E	N E b E	33·00	8·75	8·96	...	4·20	Snow.	Do. 4.	Str. 10.
17	·740	·711	·720	29·9	33·1	30·1	171	197	171	92	94	95	N E b E	N E b E	W b S	1·05	1·76	13·75	...	0·50	Str. 10.	Snow.	Cir. Str. 10.
18	·680	·660	·670	28·8	38·1	32·5	170	226	196	91	91	92	W b S	N W bW	N W	5·41	4·62	7·40	...	...	Clear.	Cir. Str. 4.	Sl't snow.
19	·700	·735	·810	20·8	27·5	24·0	118	153	130	88	88	86	W	W	W	7·50	8·75	4·96	...	Inap	Str. 10.	Str. 10.	Str. 10.
20	·873	·890	·990	21·0	28·6	26·2	116	144	154	86	83	95	W	W	W N W	1·90	4·28	3·52	...	...	Cum. Str. 10	Cir.Cum.Str.4	Cum. Str. 4.
21	30·120	30·150	30·090	22·1	31·4	21·0	115	195	111	83	90	84	W	W S W	S W b W	4·10	1·00	1·06	...	...	Str. 10.	Clear.	Do. 4.*
22	29·911	29·820	29·800	19·0	37·0	23·0	110	167	125	88	70	84	W	S b W	N W b W	2·12	0·11	2·00	...	...	Do. 10.	Cum. Str. 8.	Str. 4.
23	·900	·911	·943	- 7·0	5·8	- 2·0	030	051	011	86	79	90	W b N	W	N W b W	14·48	5·22	4·12	...	...	Clear.	Clear.	Clear.
24	·910	·800	·792	-15·2	- 1·0	- 7·5	018	038	028	69	86	81	N W b W	W b S	W b S	3·75	21·36	3·70	...	...	Do.	Do	Do.
25	·606	·451	·438	- 8·5	5·4	0·2	031	051	012	90	79	85	W b S	W b S	W b N	12·89	3·75	16·82	...	...	Str. 1.	Str. 8.	Slihgt Snow.
26	·400	·139	·186	0·3	15·8	10·4	047	098	077	90	88	83	W b N	W b N	W b N	17·20	11·25	10 00	...	0·80	Do. 10.	Cum. Str. 8.	Str. 9.
27	·599	·671	·840	4·5	18·4	14·7	047	039	089	80	82	83	W b N	W b N	N W b W	12·28	11·95	9.50	...	...	Do. 10.	Clear.	Do. 10.
28	30 030	30·110	30·199	0·0	14·7	9·0	014	089	067	80	82	90	N	N b W	W b S	0·96	0·62	1·70	...	...	Clear.	Do.	Clear.

Barometer ....
- Highest, the 12th day .... 30·244
- Lowest, the 26th day .... 29·400
- Monthly Mean .... 29·819
- " Range 0 844

Thermometer.
- Highest, the 16th day .... 40°·6
- Lowest, the 7th day. .... —33°·9
- Monthly Mean .... 11°·23
- " Range .... 74°·5
- Mean Humidity .... ·857

Greatest Intensity of the Sun's Rays .... 98°·4
No Rain fell during the month.

Snow fell on 8 days, amounting to 15 inches. Snowing 21 hours 50 minutes.
Most prevalent Wind, N.E.b E. Least prevalent Wind, N.
Most Windy Day, the 16th day; mean miles per hour, 15 87.
Least Windy Day, the 12th day; mean miles per hour, 0.00
Aurora Borealis visible on 2 nights. Might have been seen on 10 nights.
Lunar Halo visible on 1 night.
Mock Suns, (Parhelia) were seen on the morning of the 5th day.
The Electrical state of the atmosphere has been marked by moderate intensity, excepting the 14th and three following days, when it indicated a very high tension.
Ozone was often indicated, and in large quantities.
Mean of the month below that of last year 0°97.

* Lunar Halo, diameter 38°·0.

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

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

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

Date	Barometer corrected and reduced to 32 degrees, Fahr. 6 A.M.	2 P.M.	10 P.M.	MEAN.	Temperature of Air. 6 A.M.	2 P.M.	10 P.M.	MEAN.	Elasticity of Air. 6 A.M.	2 P.M.	10 P.M.	MEAN.	Humid'y of Air. 6 A.M.	2 P.M.	10 P.M.	M'N	Direction of Wind. 6 A.M.	2 P.M.	10 P.M.	Velocity of Wind. 6 A.M.	2 P.M.	10 P.M.	Rain in Inch.	Snow in Inch.
					°	°	°	°																
1	29·720	29·571	29·450	29·580	− 3·1	6·0	0·4	1·1	0·038	0·053	0·017	0·016	93	85	97	92	W N W	W	E S E	3·8	2·0	2·0	...	...
2	·183	·350	·379	·404	− 2·0	8·8	14·8	7·2	·052	·056	·087	·065	100	80	97	92	S W	Calm.	Calm.	5·2	0·0	0·0	...	2·6
3	·286	·205	·307	·266	12·8	18·0	6·8	12·5	·078	·091	·056	·075	93	90	87	90	Calm.	S S W	W S W	0·0	2·0	5·2	...	1·5
4	·339	·171	·591	·468	− 3·7	−11·7	−20·1	−11·8	·038	·025	...	...	95	90	...	...	W	N W	W N W	6·2	5·2	2·0	...	...
5	·525	·439	·543	·502	−27·2	−10·2	−13·2	−16·9	...	·026	·025	...	...	87	93	...	N W	N E b E	N W	2·0	3·8	5·2	...	...
6	·683	·807	·961	·817	−23·7	−16·3	−22·0	−20·7	...	·018	...	...	...	82	...	...	W	W	Calm.	5·2	6·2	0·0	...	...
7	30·061	30·070	·953	30·028	−26·2	−12·7	− 9·1	−16·0	...	·020	·030	...	...	74	97	...	S W	N N W	E	3·8	3·8	2·0	...	...
8	29·854	29·742	·681	29·759	− 6·0	8·3	9·4	3·9	·032	·053	·070	·052	89	77	98	88	N E	N E	N E	3·8	5·2	8·8	...	1·8
9	·644	·619	·639	·634	10·2	12·6	11·5	11·4	·065	·061	·073	·067	88	79	91	87	E N E	E N E	E N E	11·3	10·9	7·2	...	0·5
10	·721	·759	·795	·759	9·2	18·6	14·9	14·2	·067	·076	·070	·071	94	72	77	81	W	W	Calm.	2·0	2·0	0·0	...	...
11	·806	·748	·805	·786	12·3	18·4	15·6	15·1	·069	·087	·088	·081	83	83	95	87	E	E	Calm.	3·8	3·8	0·0	...	0·3
12	·947	30·023	30·116	30·029	6·5	21·7	13·3	13·8	·060	·101	·073	·079	91	87	85	88	S W	W	Calm.	2·0	2·0	0·0	...	...
13	30·180	30·150	30·089	30·140	5·4	18·7	20·9	15·0	·057	·085	·111	·084	92	81	96	90	Calm.	E N E	E N E	0·0	11·5	18·3	...	...
14	30·100	30·137	30·078	30·105	21·6	21·8	28·1	24·8	·108	·115	·138	·120	90	83	88	87	N N E	E N E	E N E	16·0	15·2	16·0	...	6·3
15	29·921	29·848	29·791	29·853	29·4	31·8	33·2	31·5	...	·167	·141	...	...	94	75	...	E N E	E N E	E N E	17·9	21·3	22·7	...	5·1
16	·666	·692	·647	·668	33·5	34·1	30·6	32·7	·109	·156	·154	·140	84	78	89	84	E N E	E N E	E N E	32·2	11·5	21·3	0·05	0·5
17	·601	·565	·513	·560	29·6	31·7	31·2	30·8	·153	·161	·168	·161	94	91	96	94	E N E	E N E	E N E	22·7	15·2	2·0	...	3·9
18	·466	·435	·404	·435	30·9	29·4	28·7	29·7	·167	·154	·155	·159	96	94	98	96	N E	N E	Calm.	3·8	8·0	0·0	Inap.	5·1
19	·443	·523	·601	·523	27·9	29·8	28·3	28·7	·146	·156	·150	·151	96	95	96	96	N E	N E b E	Calm.	8·8	10·0	0·0	...	1·3
20	·627	·674	·811	·704	28·6	34·4	30·2	30·9	·153	·171	·154	·159	99	86	91	92	W S W	Calm.	Calm.	5·2	0·0	0·0	...	0·1
21	·929	·932	·897	·919	27·9	34·5	29·9	30·8	·140	·129	·144	·138	90	64	87	80	W	Calm.	Calm.	2 0	0·0	0·0	...	...
22	·792	·621	·528	·647	25·2	27·1	25·9	26·1	·121	·145	·129	·133	89	97	89	92	N N W	N N W	W N W	10·0	8·0	9·3	Inap	0·3
23	·673	·716	·714	·701	− 1·8	3·7	− 2·5	− 0·2	·037	·040	·033	·037	87	71	79	79	W N W	W	W	11·3	9·3	10·9	...	...
24	·726	·653	·557	·645	−12·0	− 5·7	− 7·7	− 8·5	·023	·032	·030	·028	86	89	91	89	W	W N W	W N W	8·8	13·4	10·9	...	...
25	·358	·225	·229	·271	− 8·5	− 1·6	− 1·6	− 3·9	·030	·040	·042	·038	91	91	95	92	W	W	W S W	8·8	8·0	5·2	...	0·2
26	·223	·281	·364	·289	− 2·1	3·5	− 1·8	− 0·1	·050	·047	·041	·046	90	94	94	93	Calm.	N E	N E	0·0	5·2	5·2	...	...
27	·330	·486	·678	·498	− 8·9	5·5	4·7	0·4	·031	·042	·043	·039	97	69	72	79	Calm.	E	W	0·0	5·2	5·2	...	...
28	·827	·898	·999	·906	3·7	18·1	16·0	12·6	·046	·076	·072	·065	82	73	76	77	W N W	W N W	W N W	7·2	11·5	6·2	...	...
	29·6763	29·6657	29·6831	29·6749	6·75	13·62	11·30	10·55	0·080	0·093	0·092	0·088	91	83	90	88				7·28	7·15	6·02	·05	30·1

REMARKS.

1st. Lunar Corona at 10 p.m.

3rd. Auroral arch 4° above he horizen, and occasionally a few streamers, observed this about 11 p.m.

4th. At 5 p.m., dry bulb —17°·7, wet bulb—14°·9, observed dew point —27°·0.

11th. At 10 p.m., snowed for two hours, although the sky was cloudless.

12th. A good aurora observed.

27th. A good aurora observed

Maximum Barometer, 6 a.m. on the 15th	30·180
Minimum Barometer, 2 p.m. on the 3rd.,	29·205
Monthly Range	·975
Monthly Mean	29·6749
Maximum Thermometer on the 21st	36°·8
Minimum Thermometer on the 4th	—29·5
Monthly Range	66·3
Mean Maximum Thermometer	15·65
Mean Minimum Thermometer	2·39
Mean Daily Range	13 26
Mean Monthly Temperature	10·55
Greatest Daily Range of Thermometer on 22nd	32°·2
Least Daily Range of Thermomter on 19th	3°·4
Warmest Day, 16th. Mean Temperature	32·7

Coldest Day, 6th. Mean Temperature	—20·7
Climatic Difference	53·4

Possible to see Aurora on 11 Nights.
Aurora visible on 7 Nights.
Total quantity of Rain, ·05 inches.
Total quantity of Snow, 30·1 inches.
Rain fell on 3 days.
Snow fell on 14 days.

The observed Dew Point at 10 p.m. of 4th, —33°·5; at 6 a.m. of 5th, —31°·0; at 6 a.m. of 6th, —32°·5.

Note.—The 4th, 5th, 6th, 7th, and 15th days, are not included in forming the hourly and monthly means of Elasticity and Humidity.