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ARTICLE V.—*On the cold term of January*, 1859, *from observations taken at St. Martin, Isle Jésus, C. E., Lat.* 45° 32′ *N., Long.* 73° 36′ *W.*, 118 *feet above the level of the Sea.* By CHARLES SMALLWOOD, M.D., LL D., Professor of Meteorology in the University of McGill College, Montreal.

(Presented to the Natural History Society of Montreal.)

The unprecedented cold term of January, 1859, has induced me to place on record the principal atmospheric phenomena with which it was accompanied. Its advent possessed some peculiar features, not common to the normal or usual cold terms of this climate. It is much to be regretted that we possess no regular and extended system of meteorological observations, upon which we can found conclusions as to the centre or turning point of the storm. All that we know at the present is, that its course was eastward, and that its duration and intensity were remarkable.

The weather at the beginning of January, was somewhat mild, the mean temperature of the 1st day, was 30°9 F. The thermometer fell on the morning of the 3rd to—4°, and was followed on the 4th day by slight snow. The wind was from the N. E. by E. with a mean velocity of, from 9·18 to 4·17 miles per hour. The barometer on the 3rd indicated 30·416 inches. The wind, at noon on the 5th, veered by the South to S. by E., and the barometer fell to 29·621 inches. At 3 a.m., on the 6th it veered to the S. W. with a rising barometer. The

mean of the temperature on the 5th was 34°6, and on the 6th 27°3. At sunrise on the 7th day, the wind veered to N. E. by E. with a decrease in the barometric column; the lowest temperature recorded was 17°1 and the highest 36°7; snow commence to fall at 1 a.m., and ceased at 3·15 p.m., and indicated a fall of 2·16 inches; rain then set in and continued to fall till 10 p.m., and amounted to 0·021 inches; the wind veered at 10 p.m. by the North to W. by S.; the mean velocity attained during the night was 36·22 miles per hour and very squally; heavy *cumulo-strati* clouds were passing and occasional slight precipitation of snow took place in the shape of slight snow-showers during the night, and until day break, and at 3 a.m. On Saturday the 8th day the thermometer indicated 0° (zero), barometer 29·576 wind, W. by S., and varying from 13·22 to 18·33 miles per hour. The thermometer continued falling and attained a record of temperature, I believe unequalled in Canada, both as to its intensity and its duration. The following table indicates the temperature:

Saturday, 8th January, 1859,	3 a.m.		0°0 F.	
"	"	6 a.m.	— 4°1	(Below zero.)
"	"	7 a.m.	— 3°7	"
"	"	Noon.	— 2°9	"
"	"	2 p.m.	— 1°9	"
"	"	9 p.m.	— 13°0	"
"	"	10 p.m.	— 13°6	"
"	"	Midnight	— 16°4	"
Sunday, 9th	"	6 a.m.	— 29°9	"
"	"	7 a.m.	— 29°0	"
"	"	9 a.m.	— 28°4	"
"	"	Noon.	— 23°8	"
"	"	2 p.m.	— 21°5	"
"	"	9 p.m.	— 33°9	"
"	"	10 p.m.	— 34°2	"
"	"	Midnight	— 36°0	"
Monday 10th	"	6 a.m.	— 43°6	"
"	"	7 a.m.	— 43°1	"
"	"	9 a.m.	— 41°6	"
"	"	Noon.	— 20°1	"
"	"	2 p.m.	— 14°3	"
"	"	9 p.m.	— 28°8	"
"	"	10 p.m.	— 29°2	"
"	"	Midnight	— 31°6	"
Tuesday 11th	"	6 a.m.	— 37°1	"
"	"	7 a.m.	— 36°9	"
"	"	Noon.	— 24°8	"

Tuesday, 11th January, 1859,	2 p.m.	—	19°9	"
" "	9 p.m.	—	21°0	"
" "	10 p.m.	—	21°6	"
" "	Midnight	—	18°1	"
Wednesday 12th "	6 a.m.	—	19°4	"
" "	2 p.m.	—	10°4	"
" "	10 p.m.	—	5°0	"
Thursday 13th "	6 a.m.	—	3°1	"
" "	7·30 a.m.		0°0 (Zero.)	

This table shows a period of 124 hours 30 minutes during which the temperature was below zero—mercury froze in open vessels; but the column of mercury in the tube of the thermometer did not cease to contract at the lowest temperature—43°6 (below zero); and Dr. Kane in his arctic voyages mentions the fact that the mercurial column descended as low as—44°; and Sir E. Belcher is said to have observed the mercurial thermometer as low as—46°. The mean temperature of Sunday the 9th, was —27°8; and of Monday the 10th—29°0; and of Tuesday—28°2 The barometer attained at 10 p.m. on Sunday the 9th the unusual height of 30·614 inches, the mean velocity of the wind during the day which was from the E. N. E. was 8·89 miles per hour.

On the 10th the wind was from the S.W. by S., mean velocity 0·08 miles per hour. The Aurora Borealis was visible on the nights of Sunday, Monday and Tuesday, but not attended with any great display.

The cold term ended by a fall of snow which commenced at 9·45 p.m. on the 12th, and ceased at 6·10 a.m. on the 13th day, and amounted to 1·10 inches in depth.

This cold term was felt generally throughout Canada and the Eastern States, and seems to have travelled from the west, eastward. At Rochester the extreme cold was felt some hours earlier than at this place, which is 4°15′ west of this observatory, and 398 feet higher above the Sea-level, there—10° below zero was the minimum temperature. At Brooklyn near New-York, it was —9°, and is the lowest temperature recorded there for the last 70 years. At Boston it reached —14°, at Toronto —38°, at Quebec —40°1, at Huntingdon about 60 miles south of this place the mercurial thermometer indicated —44°, and mercury is said to have been frozen quite hard in 15 minutes when exposed in a saucer.

The *Ozonometer* indicated during the excessive cold but a moderate degree, varying from 3 to 5 of Schonbein's scale.

The electrical state of the atmosphere, indicated *positive* signs,

and its mean intensity during the cold term was about 5° degrees of intensity in term of Voltas' Electrometer, No. 1.

The indications of the *Psychrometer* at these low temperatures, appears somewhat remarkable and perhaps defective, the *Ice coated Bulb*, indicated at the lowest temperature a little more than a degree higher then the *dry bulb*, and this continued so with a *decreasing temperature*, but as the temperature gradually rose the *ice coated bulb* indicated as usual a lower temperature then the *dry bulb*,—which would lead to the supposition that at these extreme cold points, the ice formed rather a sheath or covering over the bulb and prevented the uniform and gradual contractions for decrease of temperature consequent on evaporation in the mercurial column, corresponding to the *dry bulb*, and it was also observed that the *ice coated bulb* was not so easily affected by slight increase of temperature as generally takes place at more moderate indications.

I have not seen the fact noticed, and would call the attention of observers to this point, but these remarks are only applicable to the extreme cold temperatures above noticed, and of which we have had hitherto so few examples.

St. Martin, Isle Jésus, C. E.,
March 1, 1859.

ARTICLE VI.—*Report on the Fisheries of the Gulf of Saint Lawrence.* By H. M. PERLEY, Esq., Her Majesty's Emigration Officer at Saint John, N.B.

(*Continued from our last.*)

THE MACKEREL.

The common Mackerel (*Scomber scombrus*) abounds in the Gulf of St Lawrence, and is one of the chief objects of pursuit with the numerous fleets of American fishing vessels, which are to be found yearly in every part of the Gulf. The Americans begin fishing for Mackerel, in the Gulf, on the first of July, and finish at the end of September; but the resident fisherman might begin this fishing earlier, and continue it until the very close of the season.

Mr. MacGregor describes the Mackerel of the Gulf as being of much finer flavour than those caught on the shores of Europe.

It has been generally supposed that the Mackerel was a fish of passage, performing certain periodical migrations—making long

voyages from south to north at one season of the year, and the reverse at another; but the error of this opinion is now generally admitted. It is known with certainty, that Mackerel remain near the coast of England at all times, as they have been taken there in every month of the year. Mr. Yarrell, whose work on British Fishes is of the highest authority, is of opinion that the Mackerel is not a migratory fish; he says—"The law of nature which obliges Mackerel and others to visit the shallow waters of the shores at a particular season, appears to be one of those wise and bountiful provisions of the Creator, by which not only is the species perpetuated with the greatest certainty, but a large portion of the parent animals are thus brought within the reach of man; who, but for the action of this law, would be deprived of many of those species most valuable to him as food, For, the Mackerel, dispersed over the immense surface of the deep, no effective fishery could be carried on; but approaching the shore as they do, from all directions, and roving along the coast in immense shoals, millions are caught, which yet form but a very small portion compared with the myriads that escape."

Although Mackerel are found in vast shoals along the whole eastern coast of New Brunswick, and within the Bay of Chaleur, yet the quantity taken by resident fisherman is so very limited, as not to furnish a sufficient supply for home consumption, and few indeed for export.

The Ports of the Province within the Gulf, exported the undermentioned quantities of Mackerel, in barrels, during the last eight years:—

Ports.	1841	1842	1843	1844	1845	1846	1847	1848	Total.
Dalhousie, ...	..	..	..	..	..	..	..	..	..
Bathurst, ...	..	..	..	..	..	33	..	4	37
Caraquette, ...	..	..	..	..	..	256	99	25	380
Miramichi, ...	..	..	..	..	..	145	47	..	192
Richibucto, ...	..	..	..	..	..	..	..	..	..
Totals,	..	..	..	..	..	434	146	29	609

This is a most "beggarly account" of a fishery which ought to be, in this Province, one of the most extensive and most lucrative. The export of 29 barrels only in the year 1848 is perfectly surprising, when it is considered that the season was one in which the Mackerel fishery was more than usually successful. In Au-

gust last, the waters of the Strait of Northumberland, from Shediac to Prince Edward Island, were perfectly alive with Mackerel. Off Point Escuminac, the American fisherman caught them with such rapidity, and in such quantities, that they were unable to clean and salt the fish as fast as they were caught; and it was reported on the coast, that they had sent on shore, and engaged some of the settlers at high wages, to go off to the vessels, and assist in these necessary operations.

Monsieur Leon Robicheaux an intelligent native fisherman, resident on Shippagan Island, from whom the writer obtained valuable information as to the Fisheries, stated, that although Mackerel were always plentiful during the season near Shippagan and Miscou, yet the resident fishermen were too idle to take them. He added, that they only caught a few as bait for Cod, or as matter of sport, when sailing to or from their stations for Cod fishing.

The American vessels which prosecute Mackerel fishing near the shores of New Brunswick, are fitted out in Maine and Massachusetts; they have two long voyages to make in going to, and returning from, their fishing ground, yet they find it profitable. If it be profitable to them, how much more so could it be made by resident fishermen, who are spared the expense of costly vessels and outfits, high wages, and long voyages.

The mode of fishing pursued by the American Mackerel Fishers who frequent the Gulf, is that with the line, called "trailing." When a "schull" is met with, the vessel, generally of 60 or 80 tons burthen, is put under easy sail, a smart breeze (thence called a Mackerel breeze) being considered most favourable. It is stated by Mr. Sabine, of Easport—who is good authority,—that he has known a crew of ten men, when fishing in the Bay of Chaleur, catch in one day, ninety packed or "dressed" barrels of Mackerel, which could not contain less than 12,000 fish.

If no fish are in sight, the American Mackerel Fisher on reaching some old resort, furls all the sails of his vessel, except the main sail, brings his "craft" to the wind, and commences throwing over bait, to attract the fish to the surface of the water. The bait is usually small Mackerel, or salted Herrings, cut in pieces by a machine, called a "bait-mill." This consists of an oblong wooden box, standing on one end, containing a roller armed with knives, which is turned by a crank on the outside; it cuts up bait very expediously. If the fisherman succeeds, the Mackerel then seem willing to show how fast they can be caught; and the fishing goes

on till the approach of night, or the sudden disappearance of the remnant of the "schull" puts an end to it. The fish are then dressed, and thrown into casks of water to rid them of blood. To ensure sound and sweet Mackerel, it is indispensable that the blood and impurities should be thoroughly removed before salting; that the salt should be of the best quality, free from lime, or other injurious substances; and that the barrels should, in all cases, be tight enough to retain the pickle.

In those Harbours of Nova Scotia which are within the Strait of Canso, Mackerel of late years, have been taken in seines, capable of enclosing and securing 800 barrels; and in these seines, 400 and even 600 barrels have been taken at a single sweep. The "drift-net" is also used; but as it is believed that this mode of fishing is not so well understood on the coast of Nova Scotia, as on that of England, the manner of fishing near the latter, with the "drift net," as described by Mr. Yarrel, is given in preference:—

"The most common mode of fishing for Mackerel, and the way in which the greatest numbers are taken, is by drift-nets. The drift-net is 20 feet deep, by 120 feet long; well corked at the top, but without lead at the bottom. They are made of small fine twine, which is tanned of a reddish-brown colour, to preserve it from the action of the salt water, and it is thereby rendered much more durable. The size of the mesh is about 2½ inches, or rather larger. Twelve, fifteen, and sometimes eighteen of these nets are attached lengthways, by tying along a thick rope, called the drift-rope, and the ends of each net, to each other. When arranged for depositing in the sea, a large buoy attached to the end of the drift-rope is thrown overboard, the vessel is put before the wind, and as she sails along, the rope with the nets thus attached, is passed over the stern into the water, till the whole of the nets are thus thrown out. The nets thus deposited, hang suspended in the water perpendicularly, 20 feet deep from the drift-rope, and extending from three quarters of a mile to a mile, or even a mile and a half, depending on the number of nets belonging to the party, or company engaged in fishing together. When the whole of the nets are thus handed out, the drift-rope is shifted from the stern to the bow of the vessel, and she rides by it as at anchor. The benefit gained by the boats hanging at the end of the drift-rope is, that the net is kept strained in a straight line, which, without this pull upon it would not be the case. The nets are "shot" in the evening, and sometimes hauled once during the night, at others allowed to re-

main in the water all night. The fish roving in the dark through the water, hang in the meshes of the net, which are large enough to admit them beyond the gill-covers and pectoral fins, but not large enough to allow the thickest part of the body to pass through. In the morning early, preparations are made for hauling the nets. A capstan on the deck is manned, about which two turns of the drift-rope are taken; one man stands forward to untie the upper edge of each net from the drift-rope, which is called casting off the lashings; others hand the net in with the fish caught, to which one side of the vessel is devoted; the other side is occupied with the drift-rope, which is wound in by the men at the capstan."

The following is a statement of the number of barrels of Mackerel inspected in Massachusetts in each year, from 1831 to 1848, inclusive:—

1831,	383,559	1840,	50,992
1832,	212,452	1841,	55,537
1833,	212,946	1842,	75,543
1834,	252,884	1843,	64,451
1835,	194,450	1844,	86,180
1836,	176,931	1845,	202,303
1837,	138,157	1846,	174,064
1838,	108,538	1847,	232,581
1839,	73,018	1848,	300,130

It does not appear what proportions of these large quantities of Mackerel were caught in British waters; but it must have been a very considerable share, if an opinion may be formed from the numerous fishing vessels of Massachusetts seen on the coast of Nova Scotia, and within the Gulf of Saint Lawrence.

From all that has been stated, it must be considered settled, that the Mackerel Fishery, as a branch of business, cannot be said to exist in New Brunswick, although the eastern shores of the Province, and the whole Bay of Chaleur, offer the greatest facilities, and the most abundant supply of fish.

It is highly desirable that something should be done to encourage and promote this fishery, which evidently offers such ample reward to the energy, enterprise, and industry of the people.

THE SALMON.

Of those Rivers of New Brunswick which flow into the Gulf of Saint Lawrence, the two largest, the Miramichi and the Restigouche, furnish the greatest supply of this well known and delicious fish; but all the smaller Rivers also furnish Salmon in greater or

less numbers. There are also various Bays, Beaches, Islands, and points of land along the coast, where Salmon are intercepted by nets, while seeking the Rivers in which they were spawned, and to which Salmon always return.

The Salmon of the Gulf are noted for their fine flavour; they are precisely similar to the *Salmo salar* of Europe.

The quantities of Salmon in the River Resticouche and Miramichi, at the first settlement of the country, were perfectly prodigious; although many are yet taken annually, the supply diminishes from year to year. And this is not surprising when it is considered that many of the Streams formerly frequented by Salmon, are now completely shut against them, by Mill Dams without "Fishways," or those openings which the British Fishery Reports designate as "Migration Passes;" that in the branches of the large Rivers, as also in the smaller Rivers, nets are too often placed completely across the Stream, from bank to bank, which take every fish that attempts to pass—that "close time" in many of the Rivers is scarcely, if at all, regarded—and that, besides the improper use of nets at all seasons, fish of all sizes are destroyed by hundreds, in the very act of spawning, by torch light and spears, at a time when they are quite unfit for human food.

The quantities of pickled Salmon in barrels, exported from the northern Ports of New Brunswick, during the last eight years, are as follows:—

Ports.	1841	1842	1843	1844	1845	1846	1847	1848	Totals.
Dalhousie,	138	273	552	591	565	766	643	381	3909
Bathurst	32	161	250	126	134	216	190	156	1265
Caraquet,	11	20	13	5	..	..	..	3	52
Miramichi,	1614	2295	1093	1616	1836	146	1531	1571	11,702
Richibucto,	20	..	107	137	77	78	61	..	480
Totals,	1815	2749	2015	2475	2612	1206	2425	2111	17,408

Since the establishment of regular Steamers from the Port of St. John to Boston, large quantities of Fresh Salmon,—packed in ice, have been exported, and the commodity has greatly increased in value. If facilities of communication were created by Railway, the fresh Salmon of the Gulf could also be sent abroad in ice, and their value when first caught would be three or four times as great as at present.

The exceeding value of the Salmon Fisheries of Ireland, and

Scotland, cause great attention to be paid by the British Fishery Boards, to the enforcement of most stringent regulations for their preservation and increase. With reference to the preservation of Salmon, the Inspectors of the Irish Fisheries reported to the Board in 1846, as follows:—"In illustration of the benefits of a steady perseverance in a proper system, we may allude to the Foyle, where the produce has been raised from an average of 43 tons previous to 1823, to a steady produce of nearly 200 tons including the Stake Weirs, in the Estuary, and very nearly to 300 tons, as we believe, in the year 1842." The Inspectors also mention the case of the small River of Newport, County Mayo, which was formerly exempt from "close season." In three years, after the Parliamentary Regulations were introduced and enforced, the produce of this River was raised from half a ton, or at the utmost, a ton every season, to eight tons of Salmon, and three tons of white Trout, for the season ending the third year.

The preservation and maintenance of the Salmon Fisheries of New Brunswick generally, is a subject well worthy of earnest attention. To prevent the destruction of the fish during the spawning season, and by improper modes of fishing, as also to provide for the passage of the fish up those Streams which they have formerly frequented, but from which they are now excluded by Mill Dams, some further enactments are absolutely necessary, and more efficient means are required for enforcing the provisions of the law. The most valuable River Fishery of the Province is in a fair way of being rendered valueless, or wholly destroyed; and as the Rivers are the natural nurseries of the Salmon, the fishery on the coast will, of course, be destroyed also.

Large quantities of Salmon are caught every season on the Labrador coast, in stake-nets placed at the mouths of Rivers, which empty into Bays and Harbours; these are split and salted in large tubs, and afterwards repacked in tierces of two hundred pounds each. A number of vessels, from Newfoundland and Canada, are engaged annually in this Fishery; but the American fishing vessels pursue it with great vigour and assiduity, and it is reported that of late years they have found it very profitable.

The quantities of pickled Salmon exported from Newfoundland in 1847, was 4,917 tierces, one half of which was the produce of the Salmon fishery on the coast of Labrador.

THE WHALE.

The extent to which the Whale Fishery is carried on, within the Gulf of Saint Lawrence, by vessels from Newfoundland, is very little known, nor is its value appreciated. The Jersey houses who have fishing establishments in Gaspé, also fit out vessels for this Fishery, which cruise about Anticosti, and the northern shore of the Saint Lawrence. Mr. MacGregor, in an official Report to the Board of Trade, thus describes this Fishery:—"The Whales caught within the Gulf of Saint Lawrence, are those called "humpbacks," which yield on an average about three tons of oil; some have been taken seventy feet long; which produced eight tons. The mode of taking them is somewhat different from that followed by the Greenland Fishers; and the Gaspé fisherman first acquired an acquaintance with it from the people of Nantucket. An active man, accustomed to boats and schooners, may become fully acquainted with everything connected with this Fishery in one season. The vessels adapted for this purpose, are schooners of seventy or eighty tons burthen, manned with a crew of eight men, including the master. Each schooner requires two boats, about twenty feet long, built narrow and sharp, and with pink sterns; and 220 fathoms of line are necessary to each boat, with spare harpoons and lances. The men row towards the Whale, and when they are very near, use paddles, which make less noise than oars. Whales are sometimes taken in fifteen minutes after they are struck with the harpoon. The Gaspé fishermen never go out in quest of them, until some of the smaller ones, which enter the Bay about the beginning of June, appear; these swim too fast to be easily harpooned, and are not besides, worth the trouble. The large Whales are taken off the entrance of the Gaspé Bay, on each side of the Island of Anticosti; and up the River Saint Lawrence as far as Bic."

Mr. Bouchette in his work on lower Canada, represents the Whale Fishery of the Gulf as meriting the attention of the Legislature, and needing encouragement; by which, he says, the number of vessels employed would be considerably increased, and this important branch of business would be so effectually carried on by the hardy inhabitants of Gaspé, as to compete, in some degree, if not rival, that of the Americans, who were, at the time Mr. Bouchette wrote, almost in exclusive enjoyment of it, and carried on their enterprising fisheries in the very mouths of the Bays and Harbours of Lower Canada.

Sir Richard Bonnycastle, in his work, entitled "Newfoundland

in 1842," says, "the Coast and Gulf Whale Fishery is now being of much value to Newfoundland." Sir Richard states, that the vessels employed are large schooners, with crews of ten men each; that the fishery is pursued during the whole of the summer months along the Coast of Labrador, and in, and through, the Straits of Belleisle; and that Whales of all sizes are taken, from the smallest "finner," up to the largest *Mysticetus*, or great common Oil Whale of the Northern Ocean, which occasionally visits these regions.

It is believed that hitherto, no attempt has been made by the people of New Brunswick, to enter into this Whale Fishery; and it would be a very proper subject for inquiry, whether it might not be profitably conducted by New Brunswick vessels, and the active and enterprising Fishermen of the Bay of Chaleur, who are equally well placed for carrying it on, as their hardy comrades on the Gaspé side of the Bay.

THE SEAL.

As the capture of the Seal is always designated "Seal Fishery," and as it is blended with the other pursuits of the Fisherman, it may be proper to mention it here.

Five kinds of Seals are said to be found in the Northern Ocean; they bring forth their young on the ice early in the Spring, and they float down upon it from the Polar Seas to Labrador, the Coast of Newfoundland, and the Gulf of Saint Lawrence. The two largest kinds are known as the Harp Seal, (*Phoca groenlandica*,) and the Hooded Seal, (*Phoca leonina*). The other three varieties are known as the "Square Flipper," the "Blue Seal," and the "Jar Seal."

Large herds of these Seals are found together upon the fields of floating ice, which, when so occupied, are called "Seal Meadows." The Seal Hunters endeavour to surprise them while sleeping on the ice, and when this occurs they dispatch the young with bludgeons; the old ones which will frequently turn and make resistance, they are obliged to shoot.

Sealing is carried on very extensively from Newfoundland in schooners of about eighty tons burthen, with crews of thirty men. It is attended with fearful dangers; yet the hardy Seal Hunter of Newfoundland, eagerly courts the perilous adventure.

The following Return of the number of Seal Skins exported from Newfoundland from 1831 to 1848 inclusive, will furnish some idea of the value of the Seal Fishery to that Colony:—

1838	375,361	1844	685,530
1839	437,501	1845	352,202
1840	631,385	1846	
1841	417,115	1847	436,831
1842	344,683	1848	521,004
1843	651,370		

The outfit for the "Seal Fishery" from the various Harbours of Newfoundland in the year 1847, was as follows:—

Vessels.	Tons.	Men.
321	29,800	9,751

Sealing among the ice, is also prosecuted, in early spring, at the Magdalen Islands; and also on the Labrador Coast, by the people who remain there during the winter in charge of the Fishing Stations, and the conduct of the Fur Trade. Seals are also caught at Labrador on the plan first adopted, by strong nets set across such narrow channels as they are in the habit of passing through.

Within a few years, the "Seal Fishery" has been commenced at Cape Breton, encouraged by a small Provincial bounty; it has been conducted in vessels not over 40 tons burthen, with crews of eight men. In 1843, twenty-two vessels went to the ice from Cheticamp and Margaree, and returned with near 10,000 Seals, which are stated to have amply requited those engaged in the adventure, as their outfit was on a very limited scale. In 1842, an enterprising Merchant of Sydney fitted out a Sealing vessel, on the Newfoundland scale, which in the short space of three weeks cleared the round sum of £14,000; and this extraordinary success encouraged others to enter into the business.

As yet, Sealing is altogether unknown to the inhabitants of New Brunswick; although it is believed that the adventure might be made successfully, by vessels departing from the north eastern extremity of the Province.

The Harbour Seal (*Phoca vitulina*) is frequently seen along the coasts of New Brunswick during the summer season, and is believed not to be migratory. They are closely watched by the Micmac Indians, who often succeed in shooting them. The fur of these Seals is sometimes very handsome; and the animal is always a rich prize to the poor Micmac.

SHELL FISH.

Under this head may be enumerated Lobsters, Oysters, Clams, Mussels, Whelks, Razor-fish, Crabs, and Shrimps, all of which are found in the Gulf, in the greatest abundance, and of excellent

quality. Mr. MacGregor states, that they are all equally delicious with those taken on English, Irish, Scotch, or Norweigian Shores.

Lobsters are found everywhere on the coast, and in the Bay of Chaleur, in such extraordinary numbers, that they are used by thousands to manure the land. At Shippagan and Caraquette, carts are sometimes driven down to the beaches at low water, and readily filled with Lobsters left in the shallow pools by the recession of the tide. Every potato field near the places mentioned, is strewn with Lobster shells, each potato hill being furnished with two, and perhaps three, Lobsters.

Within a few years, one establishment has been set up on Portage Island, at the mouth of the Miramichi River, and another at the mouth of the Kouchibouguac River, for putting up Lobsters, in tin cases, hermetically sealed for exportation. In 1845, no less than 13,000 cases of Lobsters and Salmon were thus put up at Portage Island. In 1847, nearly 10,000 cases of Lobsters only, each case containing the choicest parts of two or three Lobsters, and one and a half tons of fresh Salmon, in 2lb and 4lb cases, were put up at Kouchibouguac. The preservation of Lobsters, in this manner, need only be restricted by the demand, for the supply is almost unlimited.

The price paid for Lobsters at the establishment on Portage Island when the writer visited it, was two shillings and six pence currency (two shillings sterling) per hundred. They were all taken in small hoop-nets, chiefly by the Acadian French of the Neguac Villages, who, at the price stated, could with reasonable diligence, earn one pound each in the twenty four hours; but as they are somewhat idle, and easily contented, they would rarely exert themselves to earn more than ten shillings per day, which they could generally obtain by eight or ten hours attention to their hoop-nets.

Oysters are found all along the New Brunswick Coast, from Baie Verte to Caraquette, but not within the Bay of Chaleur. Those best known in this Province for their fine quality, are the Oysters of Shediac; but the extensive beds which formerly existed there, have been almost wholly destroyed by improper modes of fishing, an utter disregard of the spawning season, and the wanton destruction of the fish by throwing down shells upon the beds. It is a singular fact, that ice will not form over an Oyster bed, unless the cold is very intense indeed; and when the Bays are frozen over in the winter, the Oyster beds are easily discovered by the water above them remaining unfrozen, or as the French residents say,

degelé. The Oysters are then lifted upon the strong ice with rakes; the process of freezing expands the fish, and forces open the shells; the Oyster is removed, and the shells are allowed to fall back into the water, where they tend to destroy the fishery.

Some Oysters of very large size and good quality are found at Tabusintac, but those of the finest description are found on extensive beds in Shippagan Harbour, Saint Simon's Inlet, and Caraquette Bay, from which localities they are exported every season to Quebec. The number of bushels exported from the port of Caraquette during the last eight years, is as follows:—

1841,.....5,000	1845,.....2,010
1842,.....7,000	1846, ...1,915
1843,.....5,290	1847,..... 425
1844,.....6,000	1848,.....5,432

Oysters are abundant at Cocagne, Buctouche, Richibucto Burnt Church, and other places on the coast; but in general, they are too far within the mouths of the fresh water streams, and their quality is greatly inferior to those affected by sea water only.

From the manner in which the Oyster Fishery of the Gulf Shore is now being conducted, all the Oysters of good quality will, in a few years, be quite destroyed. The preservation of this fishery is of considerable importance, and it might be affected as well by judicious regulations and restrictions, as by encouraging the formation of artificial beds, or "Layings," in favourable situations. Several persons on the coast intimated to the writer, their desire to form new and extensive beds in the sea water, by removing oysters from the mixed water of the estuaries, where they are now almost worthless, if they could obtain an exclusive right to such beds when formed, and the necessary enacments to prevent their being plundered.

There are two varieties of the Clam, distinguished as the "hard-shell," and the "soft-shell." They are eaten largely in Spring, when they are in the best condition; and great quantities are used as bait for Cod. Clams are much prized by persons residing at a distance from the sea coast, and they are frequently sent into the interior, where they meet a ready sale, as they can be sold at a very low price.

The Razor fish derives its name from the shells being shaped very like the handle of a razor; the fish is well flavoured in the proper season, and not unlike the Clam, though somewhat tougher.

Crabs of all sizes, are to be had in abundance, but they are not often caught; neither are the Shrimps, which are to be seen in endless quantities. At times, the waters of the Straits of Northumberland appear as if thickened with masses of Shrimps moving about, their course being plainly indicated by the fish of all descriptions, which follow in their wake, and feed upon them greedily.

RIVER FISHERIES.

The principal Fsheries in those Rivers of New Brunswick which flow into the Gulf, in addition to the Salmon Fishery already mentioned are those for Gaspereaux, Shad, Basse and Trout. There are also Smelts, Eels, Flounders, and a great variety of small fish.

The Gaspereaux has been noticed under the head of Herring. The fish is found in almost every River, and the Gasperaux fishery has been considered of so much importance, that various Acts of Assembly have, from time to time, been passed for its regulation and protection. But these laws have either been neglected, or not properly enforced, and this fishery is rapidly declining. Very slight obstructions suffice to prevent the Gaspereaux from ascending streams to their old haunts; the dams for mills, or for driving timber, have shut them out in numerous instances from their best spawning grounds, and the greatest injury has in this way been inflicted on the fishery.

The Shad (*Alosa vulgaris* of Cuvier) of the Gulf, are not taken in such numbers, nor are they of so fine quality, as those caught in the Bay of Fundy; comparatively, they are dry and flavourless, owing as is said, to the sandy character of the shores of the Gulf, which are supposed to furnish less of the peculiar food of the Shad, than the muddy Rivers of the Bay of Fundy, where they are taken in such high perfection. This fishery has also been mentioned in several Acts of Assembly; but the habits, and most usual resorts, of the Shad of the Gulf of Saint Lawrence, have not been carefully observed. It is not improbable, therefore, that a better knowledge of the habits of the fish might lead to the fishery becoming more valuable.

The Basse, or Marine Perch, (*Perca labrax* of Cuvier) swim in shoals along the coast, and frequently ascend the Rivers to a considerable distance from the sea, to deposit their spawn. They are taken of all sizes up to 20 ℔ weight, or even more; but those of 3 ℔ to 5 ℔ are considered the best flavoured. They are some-

times salted, but generally they are eaten while fresh. This fishery has also been attempted to be regulated and preserved by law, but evidently with very little success, as it is fast decreasing. Sad havoc is made among the Basse, in the winter season, when they lie in numerous shoals half torpid, in shallow water. A large hole is cut in the ice above them, and they are lifted out with dip-nets; in this manner the Basse Fisheries, in some of the smaller Rivers, have been wholly destroyed

There are two species of Trout found in the greatest abundance in every river, stream, and brook, which finds its way from the interior of New Brunswick to the Gulf of Saint Lawrence. Of these, the Salmon Trout (*Salmo trutta*) is of the largest size, and most valuable. The common Trout (*Salmo fontinalis*) is taken in every possible variety, every where.

The Sea Trout, (*Salmo trutta marina*) seldom ascend the Rivers far above the tideway; when they first enter the estuaries early in the season, they are in the finest condition, and scarcely, if at all, inferior to Salmon. They are frequently taken of the weight of 7lb, though the most usual weight is from 2lb to 5lb. They are very abundant in June, in the Bays and Harbours o Prince Edward Island. At the Magdalen Islands they are taken in nets, and being pickled in small casks, are exported to the West Indies; if carefully cleaned, cured, and packed, they there bring a higher price than Salmon.

In the tide-way of the Rivers flowing into the Gulf, these fine fish might be taken in sufficient quantities to form an article of traffic. They afford great sport to the fly-fisher, especially when they first enter the mixed water of the tide-way in the smaller Rivers.

The common Trout (*Salmo fontinalis*) are also eagerly sought after by the disciples of Izaak Walton; and although destroyed in the most wanton and reckless manner by unthinking persons, they are still abundant. The destruction of these beautiful fish takes place by wholesale, upon many Rivers in the northern part of the Province, and one of the modes practised is called "rolling for trout." When the streams are at their lowest stage in the summer season, a dam of logs, stones, and brush, is roughly built at the lower end of some pool, in which the fish have congregated. This "rolling-dam" being constructed, the stream for some distance above the pool, is beaten with poles, and the fish are driven down to the deepest water, out of which they are swept with a net.

The writer was informed, that in this way 3,600 Trout had been taken out of one pool, at a single sweep of the net. In August 1848, 13,000 large Trout were thus taken out of one pool on the Scadouc River, while the writer was at Shediac. This practice is greatly to be deprecated, as by destroying fish of all sizes it completely breaks up the Trout fishery on those Rivers where it takes place.

The Smelt (*Osmerus eperlanus* of Cuvier, and *Osmerus viridescens* of Agassiz,) is found in excessive abundance in all the Rivers and Streams flowing into the Gulf. In the latter part of winter, when in the best condition, they are taken through holes in the ice, and at that season are a very great delicacy; they are then frequently called "frost-fish." Immediately after the ice disappears, they rush in almost solid columns up the brooks and rivulets to spawn, and are then taken by cart-loads. This Fishery, under proper management, might be made one of considerable profit, as the Smelt is really delicious, and always highly esteemed. It is believed that there are two distinct species of this fish, and that the smaller of the two, is more highly scented, as well as more highly flavoured, than the other.

Eels of large size and of fine quality, are taken every where within the Gulf: besides those consumed fresh, they are pickled in considerable quantities, as well for home consumption, as for exportation. Mr. Yarrell, in describing the Eel, says:—"They are in reality a valuable description of Fish; they are very numerous, very prolific, and are found in almost every part of the world. They are in great esteem for the table, and the consumption in our large Cities is very considerable."

In the calm and dark nights during August and September, the largest Eels are taken in great numbers, by the Micmacs and Acadian French, in the estuaries and lagoons, by torch light, with the Indian Spear. This mode of taking Eel requires great quickness and dexterity, and a sharp eye. It is pursued with much spirit, as besides the value of the Eel, the mode of fishing is very exciting. In winter Eels bury themselves in the muddy parts of Rivers, and their haunts, which are generally well known, are called "Eel Grounds." The mud is thoroughly probed with a five pronged iron spear, affixed to a long handle, and used through a hole in the ice. When the Eels are all taken out of that part within reach of the spear, a fresh hole is cut, and the fishing goes on again upon new ground.

If a market should be found for this description of Fish, they could be furnished to an unlimited extent.

The common Flounder (*Platessa plana* of Mitchel,) is found in such abundance in the Gulf, that it is used largely for manuring land. The writer has seen Potatoes being planted in hills, when the only dressing consisted of Fresh Flounders, which were used with a lavish hand. They are seldom taken by the inhabitants of the Gulf Shore, who can readily obtain so many other descriptions of Fish of superior quality. The Flounder is long lived out of the water, and bears land carriage better than most Fish; there is no reason therefore, why Flounders should not become a valuable commodity.

That the varied, extensive, and most abundant Fisheries of the Gulf of Saint Lawrence, would be greatly influenced by the construction of a Railway along the Eastern Coast of New Brunswick, there cannot be a reasonable doubt; but in all probability the proposed Railway from Shediac to the Harbour of Saint John, would affect those Fisheries in an equal, if not a greater degree.

The hardy and enterprising Fisherman on the Bay of Fundy, dread the long and dangerous voyage around the whole Peninsula of Nova Scotia, to the fishing grounds of the Gulf, a voyage which frequently lasts three weeks, and is deemed by Underwriters equally hazardous with a voyage to Europe; but it is not alone the dangers of the voyage which deters them from the prosecution of these Fisheries; it is the great loss of time they occasion, and the expense they create, as these render the adventure, too often, far from profitable.

A Railway from Shediac to the Port of Saint John, which is open at all seasons of the year, would enable the various products of the Fisheries to reach a Port of shipment in four hours, and the necessity for the long voyage around Nova Scotia would be wholly obviated. The fishing vessels could winter at any of the Ports on the Gulf Shore which they found most convenient; their stores and outfit could be sent up by Railway; and they would, in such case, enjoy the advantage of being on the fishing grounds at the earliest moment in the spring, and the Fisherman could protract his labours until the winter had again fairly set in.

The fresh Salmon, packed in ice, which were sent last season, from Saint John to Boston by the steamers, owing to the facilities of transport in the United States, in three days after they left Saint John, appeared at table, in prime condition, at Albany, Buf-

falo, Niagara Falls, New York, and Philadelphia. If the Salmon of the northern Rivers could be transported by railway to Saint John, they would find a ready market in the numerous towns and villages of the United States, and the Salmon Fishery alone, would prove a perfect mine of wealth to the northern part of the Province.

The immense products which might be obtained by a vigorous prosecution of the Fisheries for Herring, Cod, and Mackerel, would not only furnish a fruitful source of profit to a railway, but they would afford such an amount of remunerative employment to all the productive classes, as almost to defy calculation. They would enable the Province to open up and prosecute, a successful trade with several Foreign countries, with which at present the merchants of New Brunswick have no connection whatever. The farmer also, would be greatly benefitted by the extension of the Fisheries in connection with the railway, because he would not only find a more ready market for his surplus produce, but he would be furnished with wholesome and nutritious food, at all seasons of the year, on the most reasonable terms.

Aided by railways, the Fisheries of the Gulf of Saint Lawrence now of so little importance, and such limited value, would take rank as one of the highest privileges of New Brunswick—its unfailing source of wealth forever hereafter. And while the efforts of the people were successfully directed towards securing these bounties of Providence, lavished with such unsparing hand, they would rejoice in the goodness of an all wise Creator, and offer up humble but earnest thanks to Almighty God for his exceeding goodness and mercy towards his erring and sinful creatures.

ARTICLE VII.—*Catalogue of Canadian Plants' in the Holmes' Herbarium, in the Cabinet of the University of McGill College.* Prepared by the late Prof. JAMES BARNSTON, M.D.

[INTRODUCTORY NOTE.—The plants comprising this herbarium were collected and determined by Prof. A. F. Holmes, M. D., in the year 1820 and following years, and were presented by him to the University in 1856. They are admirably prepared and in

an excellent state of preservation, and represent in a very complete manner the Flora of the Island of Montreal and its vicinity. Under the care of the late Prof. Barnston, they were arranged according to the classification of Gray; the nomenclature was modernized, and a catalogue partly prepared, to which it was his intention to have added the results of his own researches, and to have published the whole as a synopsis of the Flora of Montreal. In its present form, the catalogue falls far short of this design; but it is hoped that its publication may nevertheless be regarded as a useful contribution to Canadian Botany. The Island of Montreal is geographically a very important station. Situated between the parallels of 45° and 46° N. lat., at the confluence of the St. Lawrence and the Ottawa, and presenting a great variety of soil and elevation, it affords an epitome of the botanical conditions of the middle region of Canada. The present collection also derives additional interest from the circumstance, that it affords many localities of species which have become locally extinct, owing to the progress of cultivation and the extension of the city. Lastly, the herbarium of the College being arranged in such a manner as to be easily accessible, it is hoped that the present catalogue may make it more useful to students of botany, and that it may form a groundwork for a complete Flora of the vicinity of Montreal.

The names in the catalogue are those attached to the specimens by Dr. Holmes. The more modern names, where any change has occurred, are added with the initials J. B. The Grasses and Carices of the collection, and a separate collection of Forest Trees and Shrubs, still remain unarranged, and will, if possible, be published in a supplementary list.—J. W. D.]

Ranunculaceæ.

Atragene Americana. June 4, 1822. Mountain.
Clematis Virginica. August 20, 1821. Below Hallowell's House.
Anemone Pennsylvanica. June 16, 1821. Papineau Woods, &c.
" Virginiana. July 8, 1821. Mountain.
Thalictrum dioicum. Meadow Rue.
" cornuti.
Hepatica triloba. May 4, 1821. Mountain.
Ranunculus filiformis. August 13, 1821. St. Helen's Island. (R. flammula, var. reptans, Gray, J. B.)
Ranunculus fluviatilis. June 27, '21. River St. Pierre. (R. Purshii, Torr. and Gray, J. B.)
Ranunculus delphinifolius. June 29, 1821. Lachine Woods. (R. Purshii, Torr. and Gray, J. B.)
Ranunculus hirsutus. July 23, 1821. Meadows near Gregory's. (R. Pennsylvanicus, Linn., Gray, J. B.)

Ranunculus acris (crowfoot, buttercup). June 18, 1821. Common.
" repens. August 10, 1821. Common.
" abortivus. June 21. Mountain.
" lanuginosus. June 11, 1821. Mountain. (R. recurvatus, J. B.)
Coptis trifolia (gold-thread). May 20, 1821. Mountain.
Caltha palustris (marsh marigold). May 23, 1821. Meadows, &c.
Aquilegia Canadensis (columbine). May 20, 1821. Mountain.
Actæa alba (bane-berry). May 31, 1821. Mountain.
" rubra. May 15, 1821. Papineau Road.

Menispermaceæ.
Menispernum Canadense (moonseed). July 19, 1821. St. Martin.

Berberidaceæ.
Podophyllum peltatum (may-apple). 1821. In a garden, at Nicholson's, on the mountain.

Cabombaceæ.
Hydropeltis purpurea (water shield). Sept. 3, 1821. River, near Point St. Charles. (Brasenia peltata, Pursh, J. B.)

Nymphæaceæ.
Nymphæa odorata (pond-lily). July 23, 1821. Mouth of St. Pierre.
Nuphar advena (yellow pond-lily). July 23, 1821. River St. Pierre, &c.

Sarraceniaceæ.
Sarracenia purpurea (pitcher-plant, Indian cup). June, 1820. Savanne, St. Michel.

Papaveraceæ.
Chelidonium majus (celandine). Roadside. 1821.
Sanguinaria Canadensis (blood-root). May 15, 1821. Mountain, Papineau Woods.

Fumariaceæ.
Corydalis glauca. June 16, 1821. Papineau Road.
" Canadensis (squirrel corn). May 7, 1822. Mountain. (Dicentra Canadensis, DC. Gray. J. B.)
Corydalis cucullaria (Dutchman's breeches). May 7, 1822. Mountain. (Dicentra cucullaria, DC. Gray. J.B.)

Cruciferæ.
Nasturtium amphibium. Br. and DC. July 23, 1821. Gregory's Creek.
Sisymbrium (Nasturtium) palustre. July 21, 1821. In a yard.
Dentaria diphylla (pepper-root). May 31, 1821. Mountain.
Cardamine Pennsylvanica (bitter cress). June 7, 1822. Nuns' Island, Lachine Wood. (C. hirsuta. J.B.)
Turritis (Arabis) lævigata. June 22, 1821. Mountain.
Erysimum Barbarea (winter cress). June 6, 1821. Nichol's Gully. (Barbarea vulgaris, Torr.)
Sinapis alba (white mustard). 1821. Common.
" nigra (black mustard). 1821. Common.
Thlaspé bursa-pastoris (shepherd's purse). July 11, 1821. Common. (Caprella, Vent.)
Thlaspé arvense. July 21. Common.
" campestre (Lepidium campestre). July 3, 1822. In a field, Three Rivers.
Lepidium Virginicum (wild pepper grass). Aug. 2, 1821. Roadside, Citadel Hill.

Capparidaceæ.
Cleome dodecandra. Aug. 13, 1821. Shore St. Helen's. (Polanisia graveolens, Raf., Gray, J. B.)

Violaceæ.
Viola Canadensis (Canada violet). May 31, 1821. Mountain, &c.

Viola pubescens (downy yellow violet). May 23, 1821. Papineau Woods.
" blanda (sweet white violet). May 25, 1822. Savanne, &c.
" Selkirkii (great-spurred violet). Goldie.
" striata (pale violet). May 13, 1821. Swamp, St. Denis-st.
" cucullata (common blue violet). Mountain.
" sagittata (arrow-leaved violet). May 30, 1825. Nuns' Island, Berthier, &c.

Parnassiaceæ.

Parnassia Caroliniana. 1820.

Hypericaceæ.

Hypericum ascyroides (great St John's-wort). July 29, 1821. Swamp, St Denis Street. (H. pyramidatum, Torr., J. B.)
" Canadense. July 29, 1821. Meadows between Suburbs.
" perforatum (common St. John's-wort). July 28, 1821. Swamp, St. Denis Street.
" corymbosum. July 27, 1821. Swamp, St. Denis Street, et aliis, August 8, Gregory's Woods.

Hypericum Virginicum. Aug. 11, 1821. Woods beyond Gregory's.
" sphærocarpon. July 9, 1821. Shore near River St. Pierre. (H. hypericum, J. B.)
" parviflorum. 1821. Papineau Woods. (H. mutilum, J. B.)

Caryophyllaceæ.

Alsine media (chickweed). 1821. Common. (Stellaria media, Smith [see Torrey], J. B.)

Stellaria graminea (stitch-wort). June 29, 1821. Lachine Woods. (S. longifolia, J. B.)

Arenaria lateriflora. June 16, 1821. Papineau Road. (Mœhringia laterifolia, Gray, J. B.)

Cerastium dichotomum. June 25, 1821. Mountain. (C. oblongifolium, Torrey, J. B.)
" vulgatum (mouse-eared chickweed). June 16, 1821. Common.
" viscosum. June 4, 1822. Mountain side.

Mollugo verticillata (carpet weed). Sept. 27. (An immigrant from further south, Gray.)

Portulacaceæ.

Portulacca oleracea (purslane). August 14, 1821. Common.

Claytonia Virginica (spring beauty). May 7, 1822. Mountain. (Is not this C. Caroliniana, Michaux. J. B.)

Malvaceæ.

Malva rotundifolia (Mallow). August 1, 1821. Common.

Oxalidaceæ.

Oxalis Dillenii (wood-sorrel, sheep-sorrel). June 29, 1821. Very common. (O. stricta, J. B.)
" acetosella (wood-sorrel). July 10, 1822. Woods near Montreal, Portages of Black River, Three Rivers.

Geraniaceæ.

Geranium Carolinianum (Cranesbill),
" Robertianum (herb Robert) Isle aux Hurons.

Balsaminaceæ.

Impatiens noli-me-tangere (balsamine). Aug. 9, 1821. Common in most brooks, (I. fulva, I. biflora, Pursh, J. B.)
" biflora. Aug. 31, 1821. Mountain. (I. pallida, I. noli-me-tangere, Pursh and Michaux, J. B.)

Limnanthaceæ.

Floerkea lacustris. June 7, 1822. Nuns' Island. (F. proserpinacoides, Willd., Gray, J. B.)

Rutaceæ.

Zanthoxylum fraxineum (pricky ash). June 3, 1821. Garden. (Z. Americanum.)

Anacardiaceæ.

Rhus typhina (stag's-horn sumach). July 18, 1821. Mountain.

" toxicodendron (poison ivy), var. quercifolium. June 20, 1821. Below McGillivray's.

Vitaceæ.

Vitis riparia (wild grape, winter grape). June 13, 1821. In an orchard. (V. cordifolia, var. riparia, J. B.)

Cissus hederacea (American ivy), Pursh. Sept. 18, 1821. Mountain. (Ampelopsis quinquefolia, Michaux, J. B.)

Rhamnaceæ.

Rhamnus alnifolius (buck-thorn). June 4, 1821. Savanne, St. Michel.

Celastraceæ.

Celastrus scandens (wax-work). June 13, 1821. Nichol's garden.

Sapindaceæ.

Staphylea trifolia (bladder-nut). July 19, 1821. St. Martins.

Acer saccharinum (sugar maple). June 5, '21. Above Cleghorn's.

" rubrum (red maple). April 30, 1824, and Sept. 27.

" spicatum (mountain maple). May 31, 1821. Mountain.

Polygalaceæ.

Polygala verticillata (milk-wort). Sept. 11, 1821. Boucherville Island.

" paucifolia, Blair.

Leguminosæ.

Trifolium repens (white clover). July 8, 1821. Mountain.

" pratense (red clover). June 13, 1821. Papineau Wood.

Astragalus Canadensis. Sept. 8, 1821. Island opposite Point St. Charles.

Hedysarum glutinosum. 1821. Papineau Wood. (Desmodium nudiflorum, DC.)

" acuminatum. Aug. 2, 1821. Mountain, &c. (Desmodium acuminatum, DC.)

" Canadense. July 18, 1821. Cross-road beyond the Tanneries. (Desmodium Canadense, DC.)

Vicia cracca (wild vetch). 1820.

Lathyrus stipulaceus (marsh vetchling). July 9, 1821. Shore, Chapman's Brewery. (L. palustris, var. myrtifolius.)

" venosus. July 23, 1821. River St. Pierre.

" palustris (marsh vetchling). July 14, 1821. St. Martin; also Three Rivers.

(Phaseolus diversifolius, J. B.)

Vicia sativa (common vetch). July 21. Nichol's Gully.

Glycine apios (ground-nut). Aug. 22, 1821. Nichol's Gully, &c. (Apios tuberosa, Torrey.)

" monoica. Aug. 20, 1821. Hallowell's, &c. (Amphicarpæa monoica, Torrey.)

Rosaceæ.

Prunus Pennsylvanica (wild cherry). May 22, 1821. Nichol's. (Cerasus Pennsylvanica, J. B.)

" serotina (choke cherry). May 29, '21. Nichol's. (?Virginiana.)

Spiræa latifolia (meadow sweet). Aug. 2, 1821. Papineau Woods. (S. salicifolia, Gray, J. B.)

" tomentosa, second specimen. August 2, 1821, Papineau Woods, &c.

" opulifolia, second specimen. July 19, 1821. St. Martin.

Agrimonia eupatoria. July 19, 1821. Below Quesnel's.

Sanguisorba Canadensis (Canadian burnet). 1820. Savanne.

Geum rivale (purple avens). June 11, 1821. Hallowell's, &c.
" album. June 29, 1821. Lachine Woods. (G. Virginianum, Gray, J. B.)
" strictum (Canadense). July 8, 1821. Mountain.
Potentilla anserina. June 18, 1821. Common.
" palustris.
" fruticosa. June 4, 1821. Savanne. July 14, 1821.
" tridentata. July 2, 1822. Three Rivers.
" Norvegica. July 19, 1821. Common.
" simplex (cinquefoil). June 22, 1821. Field above Cemetière. (P. Canadensis.)
Fragaria Canadensis (Virginian strawberry). May 18, 1821. Common.
Dalibarda repens. July 14, 1821. Savanne et aliis.
Rubus villosus (blackberry). June 11, 1821. Mountain.
" strigosus (wild raspberry). June 29, 1821. Lachine Wood.
" odoratus (purple-flowering raspberry). June 22, 1821. Mountain.
" trivialis (low blackberry). June 22, 1821. Mountain. (R. Canadensis, Gray, J. B.)
" trifloris (dwarf raspberry) May 15,'21. Papineau Woods,&c.
" occidentalis (black raspberry). June 6, 1821. McGillivray's.
Rosa Carolina. June 20, 1821. Below McGillivray's. (Probably R. blanda, J. B.)
" Carolina. July 23, 1821. Bank of River St. Pierre.
" rubiginosa (sweet-briar). June 20, '21. Below McGillivray's.
Cratægus coccinea (scarlet-fruited thorn). May 30, 1821. Nichol's.
" crus-galli (cock-spur thorn). June 6, '21. McGillivray's.
" tomentosa (black or pear thorn), var. punctata, Gray.
Aronia melanocarpa. June 16, 1821. Papineau Woods. (Pyrus arbutifolia, Torrey, J. B.)
" ovalis (shad-bush). May 31, 1821. Mountain. (Amelanchier Canadensis, var. oblongifolia, Torrey.)
" botryapium. May 20, 1821. Mountain. (Amelanchier Canadensis.)
Sorbus Americana (mountain ash). June 16, 1821. Papineau Woods. (Pyrus Americana, DC.)

Lythraceæ.

Lythrum verticillatum. Aug. 8, 1821. Mouth of River St. Pierre. (Nesæa verticillata, J. B.)

Onagraceæ.

Œnothera muricata. July 19, 1821. Below Quesnel's. (Œ. biennis, var. muricata.)
" biennis (evening primrose). July 19, 1821. Below Quesnel's, et aliis. (Var. grandiflora, J. B.)
" pusilla. June 18, 1821. (Œ. pumila, J. B.)
Epilobium augustifolium (willow herb). July 14, 1821. Savanne, et aliis.
" tetragonum. July 29, 1821. Swamp, St. Denis Street. (E. coloratum, Torrey, J. B.)
" palustre. August 11, 1821. Woods beyond Gregory's. (Probably E. coloratum, J. B.)
" lineare. August 11, 1821. Gregory's Meadows. (E. palustre, var. lineare, Gray, J. B.)
Isnardia palustris (water purslane). July 23, 1821. Bank of the River St. Pierre. (Ludwigia palustris, Ell., Gray, J. B.)
Circæa Lutetiana (enchanter's night-shade). July 14, 1821. Savanne, &c.
" Alpina. July 12, 1821. Mountain, &c.

Myriophyllum spicatum (water milfoil). July 23, 1821. Gregory's Pond.

Grossulaceæ.

Ribes ———? June 4, 1854. Savanne. (Char. very close to R. rotundifolium, Michaux, Torrey, J. B.)

" triflorum (wild gooseberry). May 30, 1821. Papineau Woods. (Very likely R. cynosbati [see Torr. and also Gray] J. B.)

" floridum (wild black currant). May 22, 1821. Hallowell's Swamp, &c.

" rubrum (red currant). May 30, 1821.

" prostratum (fetid currant). L'Iber.

" lacustre (swamp gooseberry). June 4, 1821. Savanne.

Cucurbitaceæ.

Sicyos angulatus (star cucumber). Sept. 18, 1821. Field between Suburbs.

Crassulaceæ.

Penthorum sedoides (Ditch stone-crop). July 23, 1821. Edge of River St. Pierre.

Saxifragaceæ.

Saxifraga nivalis (early saxifrage). May 20, 1821. Mountain. (S. Virginiensis, J. B.)

Chrysoplenium Americanum (golden saxifrage). 1821. Mountain.

Mitella dyphilla (mitre wort). May 23, 1821. Mountain.

" cordifolia. June 4, 1821. Savanne, &c. (M. nuda, J. B.)

Tiarella cordifolia. May 23, 1821. Mountain.

Umbelliferæ.

Pastinaca sativa (parsnip). July 19, 1821. Common.

Heracleum lanatum (cow parsnip). June 30, 1821. Bank, mouth of the River St. Pierre.

Smyrnium integerrimum. June 22, 1821. Small mountain. (Zizia integerrina, DC., J. B.)

" aureum. June 7, 1822. Nuns' Island. (Thaspium aureum, Nutt, Gray, J. B.)

Sanicula Marilandica (snake root). June 18, 1821. Mountain, &c.

Cicuta maculata (spotted cowbane). July 19, 1821. Fields below McGillivray's, &c.

" bulbifera. Aug. 11, 1821. Woods beyond Gregory's.

Sium lineare. July 23, 1821. Bank of River St. Pierre.

" latifolium. July 27, 1821. Near Gregory's.

Chærophyllum Canadense. (Cryptotænia Canadensis, DC. Torrey, J. B.)

Myrrhis longistylis (smooth sweet cicely). June 29, 1821. Lachine Woods. (Osmorrhiza longistylis, DC., J. B.)

Chærophyllum Claytoni (hairy sweet cicely). June 11, 1822. Lachine Woods, Mountain. (Osmorrhiza brevistylis, DC., see Torrey, J. B.)

Araliaceæ.

Aralia racemosa (spikenard). August 2.

" nudicaulis (wild sarsaparilla). June 11, 1821. Mountain.

" hispida (bristly sarsaparilla). July 5, 1822. Three Rivers.

" trifolia (dwarf ginseng). May 15, 1821. Papineau Woods.

Panax quinquefolia (ginseng). 1821. Mountain. (Aralia quinquefolia, J. B.)

Cornaceæ.

Cornus Canadensis (bunch-berry, pigeon-berry). 1821. Not uncommon.

" alternatifolia. Aug. 31, 1825.

" sericea (silky cornel or dogwood). June 30, 1825.

" circinata (round-leaved dogwood). 1821.

" alba (red-osier dogwood). 1821. (C. stolonifera, Michaux, J. B.)

Caprifoliaceæ.

Lonicera parviflora (small honeysuckle). 1821. Mountain.
Xylosteon ciliatum (fly honeysuckle). May 25, 1822. Savanne and Papineau Woods. (Lonicera ciliata, Muhl., Gray, J. B.)
Lonicera oblongifolia (swamp honeysuckle), Muhl., J. B.
Linnæa borealis (twin flower). July 14, 1821. Savanne, &c.
Diervilla humilis (bush honeysuckle). 1821. Mountain. (Diervilla trifida, Mœnch, Gray, J. B.)
Triosteum perfoliatum. Oct. 3, 1821. Papineau Woods.
Sambucus Canadensis (elder), July 18, 1821. Roadside, cross-road near Côte St. Hilaire.
" pubescens (red-berried elder). May 20, 1821. Mountain. (S. pubens, Gray, J. B.)
" ebulus. July 7, 1821. Roadside, Côte St. Antoine. (Dwarf-elder mentioned in Hooker, Gray and Torrey, J. B.)
Viburnum oxycoccus (tree-cranberry). June 8, 1821. Nichol's Gully. (V. opulus, L., Gray and Torrey, J. B.)
" lentago (sheep-berry). June 6, 1821. Nichol's Gully.
" acerifolium. July 16.
" lantanoides. 1820.
" nudum. July 2, 1822. Three Rivers; also wood above Cadieux. (Approaches var. cassinoides, Gray, J.B.)

Rubiaceæ.

Galium asprellum (rough bedstraw). 1821. Common.
" Bermudianum. June 22, 1821. Mountain. (More likely G. Circæsans [see Gray, Torrey and Hooker], J. B.)
" triflorum. June 22, 1821. Mountain.
" strictum. July 29. (Equivalent to G. boreale, L, [see Hooker, Torrey and Gray,] J. B.)
" aparine. June 7, 1822. Nuns' Island.
" trifidum. (L. J. B.)
" boreale.
Mitchella repens (partridge-berry). July 14, 1821. Savanne et aliis
Cephalanthus occidentalis (button-bush). August 11, 1821. Gregory's Meadows.
Houstonia (Oldenlandia) purpurea, vel ciliolata. Blair, Belleville, and above Fort George.
Houstonia cærulea, Gray.

Compositæ.

Eupatorium verticillatum. 1820. Côte St. Paul. (Eupatorium purpureum, J. B.)
" maculatum. August 24, 1821. Papineau Woods. (Eupatorium purpureum.)
" ageratoides (white snake-root). August 20, 1821. Hallowell's.
" perfoliatum (thorough-wort). August 9, 1821. Between Recollet Street and St. Antoine Suburbs.
Aster divergens. Aug. 28, 1821. Nichol's. (A. miser, var. J. B.)
" lanceolatus? Aug. 22, 1821.
" macrophyllus. Aug. 31, 1821. Mountain.
" patens. August 31, 1821. Common.
" cordifolius. August 28, 1821. Common.
" rigidus. Sept. 10, 1821. (Diplopappus linarifolius.)
" sagittifolius. Sept. 3, 1821. Côte St. Paul.
" amygdalinus, Pursh. (A. umbellatus, Aiton.) Aug. 11, 1821. Woods beyond Gregory's. (Diplopappus umbellatus, Torrey and Gray.)

Aster puniceus. August 20, 1821. Hallowell's.
" acuminatus. August 17, 1821. Mountain.
Erigeron heterophyllum (scabious). Aug. 28, 1821. Cross-road, Côte des Neiges. (Erigeron annuum.)
" strigosum. July 14, 1821. Savanne.
" Canadense (horse-weed). Aug. 2, 1821. Papineau Road.
" *purpureum (flea-bane). June 13, 1821. Mountain.* (E. Philadelphicum.)
Solidago livida. Sept. 8, 1821. Côte St. Paul. (S. cæsia.)
" latifolia. August 17, 1821. Mountain.
" bicolor. August 31, 1821. Mountain.
" macrophylla. August 3, 1824.
" nemoralis. Aug. 31, 1821. Field above Cleghorn's.
" altissima, var. vulgaris. Aug. 24, '21. Papineau Woods.
" procera. August 20, 1821. Wood below Hallowell's. (S. Canadensis, var. procera, Torrey, J. B.)
" Canadensis. Aug. 3, 1821. Nichol's Gully, &c. &c.
" lanceolata. Sept. 8, 1821. Côte St. Paul.
Ambrosia artemisifolia (Roman rag-weed). Roadside.
" trifida (great rag-weed). August 8, 1821. Common.
Xanthium strumarium (cockle-bur). August 13, 1821. Bridge, River St. Pierre.
Rudbeckia laciniata (cone-flower). August 28, 1821. Cross-road, Côte des Neiges; also River St. Pierre.
Helianthus decapetalus (wild sunflower). Aug. 17, 1821. Mountain.
" tracheleifolius. August, 1821. Mountain.
Bidens pilosa (tick-weed). July 17, 1821. Field above French burying-ground.
" connata (swamp beggar-ticks), August 17, 1821. Field above French burying-ground.
" Beckii (water-marigold). August 27, 1821. River, near Point St. Charles.
" cernua (bur-marigold). Sept. 3, 1821. Côte St. Paul. Common.
Helenium autumnale (sneeze-weed). Sept. 11, 1821. Boucherville Islands.
Achillea millefolium (yarrow). 1821. Common.
Anthemis cotula (May-weed). 1821. Very common; roadside. (Maruta cotula.)
Chrysanthemum Leucanthemum (white-weed). June 13, 1821. (Leucanthemum vulgare.)
Artemisia vulgaris (mug-wort). Sept. 8, 1821. Common.
Gnaphalium uliginosum (cud-weed). August 20, 1821. Between suburbs.
" luteo-album? Sept. 8, 1821. Côte St Paul.
" margaritaceum (pearly everlasting). August 2, 1821. Papineau Wood. (Antennaria margaritacea, J. B.)
" plantaginifolium (plantain-leaved everlasting). 1821. Common. (Antennaria plantaginifolia, J. B.)
Senecio vulgaris (groundsel). July 7, 1822. Roadside.
" hieracifolius (fire-weed). August 15, 1821. Roadside. (*Erechtites hieracifolia.*)
Cnicus altissimus (tall thistle). Aug. 28, 1821. Road St. Catherine. (Cirsium altissimum, J. B.)
" muticus (swamp thistle). (Cirsium muticum.)
" discolor. August 17, 1821. Field above French burying-ground. (Cirsium discolor.)
" horridulus (yellow thistle). 1821. Very common. (Cirsium horridulum.)

Arctium lappa (burdock). August 7, 1821. Common. (Lappa major, Gray, J. B.)
Cichorium intylus (chicory). July 19, 1821. Rather common.
Leontodon taraxacum. 1821. Very common. (Taraxacum dens-leonis.)
Hieracium Kalmii (Canada hawk-weed). Aug. 17, 1821. Mountain. (H. Canadense, Torrey, J. B.)
Hieracium paniculatum (panicled hawk-weed). August 2, 1821. Papineau Wood.
" Marianum (rough hawk-weed). Aug. 24, 1821. Gully, Papineau Road. (H. scabrum, Torrey, J. B.)
Prenanthes cordata (tall white-lettuce). Aug. 24, 1821. Papineau Wood. (Nabalus altissimus, Torrey, J. B.)
" virgata? Aug. 17, 1821. Mountain.
" alba (white-lettuce). Sept. 8, 1821. Côte St. Paul. ("Nabalus albus.")
" racemosa. August 11, 1821. Hallowell's. (Nabalus racemosus.)
Sonchus arvensis (corn sow-thistle). August 19, 1821. Between suburbs.
" palustris. Aug. 17, 1821. Between suburbs.
" leucophaeus. July 14, 1821. Savanne, et aliis. (Mulgedium leucophæum, Gray, J B.)
" oleraceus (sow-thistle). July 19, 1821. Below Quesnel's.
Lactuca elongata (wild lettuce). Aug. 24, 1821. Papineau Wood.

Lobeliaceæ.

Lobelia cardinalis (cardinal flower). Sept. 3, 1821. Gulley, Côte St. Paul.
" inflata (Indian tobacco). Aug. 2, '21. Papineau Wood, &c.
" Kalmii. Sept. 11, '21. Côte St. Paul, Boucherville Islands.

Campanulaceæ.

Campanula rotundifolia (harebell). July 20, 1822. Falls of Grande Mou, River St. Maurice.
" aparinoides (marsh bellflower), Pursh. Aug. 17, 1821. Meadow between suburbs.

Ericaceæ.

Vaccinium corymbosum (swamp blueberry), Torrey, J. B.
" Pennsylvanicum (Torrey), (or V. corymbosum, var. pallidum, of Gray, J. B.
" oxycoccus (small cranberry). Oxycoccus palustris. 1820. Savanne St. Michel.
Gaultheria hispidula (creeping snowberry). August 21, 1821. (Chiogenes hispidula, Torrey and Gray, J. B.)
" procumbens (winter-green, tea-berry, checker berry). Aug. 2, 1821. Papineau Woods.
Epigæa repens (trailing arbutus, May flower). 1821. Three Rivers.
Andromeda polifolia. May 26, 1825.
" calyculata, Torrey. (Cassandra calyculata, Gray, J.B.)
Kalmia glauca (pale laurel). July 14, 1821. Savanne.
" angustifolia (sheep laurel). July 14, 1821. Savanne.
Ledum palustre (Labrador tea). June 4, 1821. Savanne.
Rhodora Canadensis. June 4, 1821, Savanne, and June 14, 1821, wood above Cadieux.
Pyrola rotundifolia. July 8, 1821. Mountain.
" uniflora. July 8, 1821. Mountain swamp, et aliis. (Moneses uniflora, J. B.)
" umbellata. Aug. 2, 1821. Mountain and Papineau Woods. (chimaphila umbellata, J. B.)
" secunda. July 8, 1821. Mountain swamp.
" asarifolia. July 10, 1822. Portage des Grès, Black River. (var. P. rotundifolia.)

Pyrola minor. July 8, 1821. Mountain swamp.
" elliptica (with two bracts). July 2, 1825.
Monotropa uniflora (Indian-pipe, death-flower). August 7, 1821. Mountain.
Ilex Canadensis (mountain holly). June 4, 1821. Savanne. (Nemophanthes Canadensis, DC., Gray, J. B.)
Prinos verticillatus (black alder). July 3, 1822, Wood above Cadieux. Oct. 3, 1821, Papineau Woods. (Ilex verticillata, Gray, J. B.)

Plantaginaceæ.

Plantago major (plantain). 1821. Gregory's Wood. Common.

Primulaceæ.

Lysimachia capitata (tufted loose-strife). July 4, 1822. Island above Nuns' Island. (Naumburgia thyrsiflora, Gray, J. B.)
Lysimachia ciliata. Aug. 2, 1821. Papineau Woods, &c.
" racemosa. June 23, 1821. Gregory's Meadows. (L. stricta, Ait., J. B.)
Trientalis Americana (starflower). June 11, 1821. Mountain, &c.

Lentibulaceæ.

Utricularia vulgaris (bladder-wort). July 23, 1821. River St. Pierre.

Orobanchaceæ.

Orobanche Virginiana (beech-drops). Oct. 3, '21. Papineau Woods. (Epiphegus Americanum, Torrey, and E. Virginiana, Gray, J.B.)

Scrophulariaceæ.

Scrophularia Marilandica (fig-wort). June 11, 1821. Mountain. (S. nodosa, J. B.)
Verbascum thapsus (mullein) 1821. Common in fields.
Mimulus ringens (monkey flower). July 12, 1821. Pond at the Cross, et aliis.
Lindermia pyxidaria (false pimpernel). Sept. 8, 1821. Rocks, Point St. Charles. (L. attenuata, Torrey, Ilysanthes gratioloides, Gray, J. B.)
Veronica anagallis (water speedwell). June 27, 1821. Lachine Woods.
" scutellata (marsh speedwell). June 29, 1821. Lachine Woods.
" peregrina (purslane speedwell). June 4, 1822. Rather common, Mountain side.
" serpyllifolia (thyme-leaved speedwell). May 29, 1821. (same with white flowers, Berthier.)
Gerardia purpurea. Aug. 17, 1821. Between the Recollet and St Antoine Suburbs.
Pedicularis Canadensis. May 31, 1821. Mountain.
Melampyrum arvense. July 12, 1822. Three Rivers. (M. Americanum.)

Acanthaceæ.

Justicia pedunculosa (water willow). June 30, 1821. Mouth of the St. Pierre. (Dianthera Americana, J. B.)

Verbenaceæ.

Verbena angustifolia. July 3, 1822. Island above Nuns'.
" hastata (blue vervain). July 18, 1821. Below Quesnel's.
" urticifolia. August 1, 1821. Roadside, Côte St. Antoine, et aliis.
Phrymna leptostachia (lop-seed). July 14, 1821. Savanne, et aliis.

Labiatæ.

Teucrium Canadense (wood-sage). Sept. 11, 1821. Boucherville Island.
Lycopus Europæus. July 29, 1821. Meadows.
" Virginicus (bugle-weed). Aug. 2 1821. Papineau Wood.

Mentha tenuis. Sept. 1, 1821. Roadside, Côte St. Charles. (M. viridis.

Mentha borealis (wild-mint). July 27, 1821. Mouth of River St. Pierre, et aliis. (M. Canadensis, Torrey, J. B.)

Pycnanthemum lanceolatum (mountain-mint). October 10, 1821. Nuns' Island.

Hyssopus petoides. August 17, 1821. Mountain. (Lophanthus nepetoides, J. B.)

Nepeta cataria (catnip). Aug. 7, 1821. Mountain, near McTavish's.

Dracocephalum Virginianum (false dragon-head). Sept. 8, 1821. Small island opposite Point St. Charles. (Physostegia Virginiana, Gray, J. B.)

Prunella vulgaris (heal-all). July 19, 1821. Below Quesnel's.

Scutellaria lateriflora (skull-cap). August 11, 1821. Wood beyond Gregory's.

" galericulata. Aug. 2, 1821. Papineau Woods, et aliis.

" parvula. June 22, '21. Mountain, below Priests' farm.

Galeopsis tetrahit (hemp-nettle). August 1, 1821. Common.

Stachys aspera. Sept. 11, 1821. Boucherville Islands. (S. palustris, var. aspera, Gray, J. B.)

Leonurus cardiacea (mother-wort). September 2, 1821. Roadside, Sherbrooke Street.

Borraginaceæ.

Lycopsis arvensis (small bugloss). June 20, 1821. Open lot, St. James Street.

Lithospermum officinale (gromwell). 1821. Common.

Cynoglossum officinale (hound's-tongue). 1821. Common.

Myosotis lappula (stick-seed). 1821. Common. (Echinospermum lappula, J. B.)

Cynoglossum amplificaule (wild comfrey). June 11, 1821. Mountain. (C. Virginicum, Gray, J. B.)

Hydrophyllaceæ.

Hydrophyllum Virginicum (water-leaf). June 16, 1821. Papineau Woods, &c.

Convolvulaceæ.

Convolvulus sepium (hedge bindweed). July 27, 1821. Near the mouth of River St. Pierre. (Calystegia sepium, R. Br. Gray, J. B.)

Convolvulus stans (low bindweed). July 2, 1822. Three Rivers. (Calystegia spithamæa of Pursh [see Gray and Torrey], J. B.)

Cuscuta Americana (dodder). Sept. 11, 1821. Boucherville Island. (C. Gronovii, Willd., Gray, J. B.)

Solanaceæ.

Solanum nigrum (nightshade). Aug. 8, 1821. Garden, Point St. Charles, &c.

Nicandra physaloides. Sept. 7, 1821. Garden, but wild.

Datura stramonium (thorn-apple). Sept. 3, 1821. Grey Nuns' court.

Hyoscyamus niger (black henbane). 1821. Common, roadside.

Gentianaceæ.

Gentiana saponaria (soapwort gentian). Sept. 3, 1821. Meadows, Côte St. Paul, Sept. 11.

Menyanthes trifoliata (buck-bean). May 28,'21. Pool near the Cross.

Apocynaceæ.

Apocynum hypericifolium (Indian hemp). July 27, 1821. Bridge, River St. Pierre. (A. cannabinea, var. hypericifolium, Gray.)

Apocynum androsæmifolium (dogbane). June 21, 1821. Mountain.

Asclepiadaceæ.

Asclepias syriaca (milkweed, silkweed). July 27, 1821. Common. (A. cornuti, Gray, J. B.)

" incarnata. July 22,'21. Meadows, Recollet Suburb, &c.

Oleaceæ.

Fraxinus epiptera (white ash). June 25, 1821. Mountain. (F. Americana.)

" sambucifolia (black ash). June 5, Nichol's, and May 17.

Aristolochiaceæ.

Asarum Canadense (wild ginger). May 15, 1821. Mountain, Papineau Woods, &c.

Chenopodiaceæ..

Chenopodium album (lamb's quarter). 1822. Common.

" hybridum (goose-foot). Aug. 28, 1821. St. Catherine Wood.

Blitum capitatum (strawberry-blite). 1820.

Atriplex patula (orache). Aug. 22, 1821. Roadside. (A. hastata, Gray, J. B.)

Amarantaceæ.

Amaranthus hypochondriacus (prince's feather). Sept. 17, 1821. Roadside, Bleury Street.

" viridis. Aug. 13, 1821. Vacant lot, St. James Street.

" retroflexus (pig-weed). Sept. 3, 1821. Common.

Polygonaceæ.

Polygonum Persicaria. July 19, 1821. Common.

" lapathifolium. July 21, 1821. Between Suburbs. (P. nodosum, Pers., Gray, J. B.)

" coccineum (amphibium, L.), var. terrestre. Sept. 11, 1821. Boucherville Island.

" Pennsylvanicum. July 23, 1821. Mouth of River St. Pierre, et aliis.

" mite. Sept. 3, 1822. Meadows, Côte St. Paul.

" Virginianum. Sept. 11, 1821. Boucherville Island.

" aviculare. August 11, 1821. (Common with var. P. tenue, J. B.)

" sagittatum. Aug. 17, 1821. Between Suburbs.

" hydropiperoides. Aug. 31, 1821. Very common.

" coccineum. July 29, 1821. Swamp, St. Denis Street. (P. amphibium, var. aquaticum, J. B.)

" scandens. August 20, 1821. Near Hallowell's. (P. dumetorum, Gray, J. B.)

" convolvulus. July 19, 1821. Below Quesnel's.

Rumex Britannicus (swamp dock). August 11, 1821. Gregory's meadows. (See Torrey, also Gray, R. verticillatus.)

" verticillatus. June 29, 1821. Lachine Road.

" crispus (curled dock). 1821. Common.

" obtusifolius (bitter dock). July 13, 1821. Ditch near Beaver Hall.

" acetosella (field sorrel). June 16, 1821. Papineau Road, common.

Thymeleaceæ.

Dirca palustris (leather-wood).

Euphorbiaceæ.

Euphorbia Helioscopia (sun-spurge).

Acalypha Caroliniana. Aug. 7, 1821. Common.

Urticaceæ.

Ulmus Americana (elm). April 30, 1824. Nichol's Gully, &c.

" fulva (slippery or red elm). April 30, 1824.

Celtis occidentalis (hackberry),

Urtica divaricata (wood-nettle). Aug. 7, 1821. Mountain. (U. Canadensis, Torrey, Laportea Canadensis, Gray.)

" pumila (buck-weed). Aug. 17, 1821. Mountain. (Adike pumila, Torrey, Pilea pumila, Gray.)

" procera (tall-nettle). Aug. 20, 1821. Wood near Hallowell's &c. (U. gracilis, Gray.)

Pilea glabra. May 19, 1821. St. Martin. (P. Americana, Torrey, var. pubescens, Gray, J. B.)
Cannabis sativa (hemp). July 29, 1821. Common, roadside.

Platanaceæ.

Platanus occidentalis (plane-tree). May 29, 1825.

Juglandaceæ.

Juglans alba (shell-bark hickory). (Carya alba.)
" tomentosa (mocker-nut hickory). (Carya tomentosa.)
" sulcata (thick shell-bark hickory). (Carya sulcata.)
" amara (bitter-nut hickory). (Carya amara.)
" cinerea (butternut). Mountain.

Cupuliferæ.

Quercus olivæformis (bur-oak). (Q. macrocarpa, var. olivæformis, Gray.)
" rubra (red oak).
" coccinea (scarlet oak).
Corylus avellana (hazel-nut). June 22, 1821. Small mountain. (C. rostrata, J. B.)
Carpinus Americana (hornbeam).
Ostrya Virginica (hop hornbeam).
Fagus ferruginea (beech).

Myricaceæ.

Myrica gale (sweet gale). Sept., 1821. Island opposite Point St. Charles.

Betulaceæ.

Betula nana (dwarf-birch). June 9, 1825.
" papyracea (canoe birch). May 11, 1825, and Sept. 11.
" populifolia (poplar-leaved birch). Sept. 26. (B. alba, var. populifolia.)
Alnus serrulata (smooth alder.) July 29.
" undulata (green alder). June 11, 1821. (A. viridis.)

Salicaceæ.

Populus angulata (angled cotton-wood). Sept., 1821.
" tremuloides (aspen). May 10, 1821.
" grandidentata. September 30.

Coniferæ.

Pinus balsamea (balsam fir). May 25, 1821. Savanne. (Abies balsamea, Gray.)
" strobus (white pine). May 25, 1821. Savanne.
" pendula (larch, tamarack). (Larix Americana.)
Taxus Canadensis (ground-hemlock). May 20, 1824.

Araceæ.

Arum triphyllum (Indian turnip). June 16, 1821. Papineau Wood.
Symplocarpus fœtidus (skunk-cabbage). Salisb.

Typhaceæ.

Sparganium simplex (bur-reed). July 23, 1821. Meadows near Gregory's.
" ramosum. June 29, 1821. Lachine Wood, et aliis.
Typha latifolia (cat-tail). July 24, 1821. Savanne.
" vulgaris. Sept. 11, 1821. Boucherville Islands.

Lemnaceæ.

Lemna polyrrhiza (duck-weed). Sept. 8, 1821. Common.

Naiadaceæ.

Potamogeton compressus (pond-weed). July 29, 1824.
" fluitans. August 14, 1821.
" lucens. Sept. 8, '21. River, near Point St. Charles.
" natans. July 23, 1821. River St. Pierre.
" perfoliatus. July 27, 1821. River St. Pierre and Three Rivers.

Alismaceæ.

Alisma plantago (water-plantain). July 23, 1821. Near Gregory's. (Var. Americanum, J. B.)

Sagittaria sagittifolia (arrow-head). July 29, 1821. (Var. variabilis, Gray.)

" latifolia. Aug. 4. At Nichol's. (Var. variabilis.)

" gracilis. July 27. River St. Pierre.

Hydrocharidaceæ.

Vallisneria spiralis (tape-grass). Sept. 8, 1821. River, near Point St. Charles.

Orchidaceæ.

Orchis spectabilis. 1821.

" dilatata. June 11, 1821. Mountain swamp. (Platanthera dilatata.)

" fimbriata. July 23, 1821. Gregory's Meadows, et aliis. (Platanthera psycodes, var. grandiflora, Torrey.)

" orbiculata. June 11, 1821. Mountain-swamp and Portage des Grês. (Platanthera orbiculata.)

Habenaria macrophylla. July 10, 1822. Portage des Grès. (Platanthera orbiculata.)

Satyrium bracteatum. July 5, 1822. Swamp and Rivers. (Platanthera bracteata.)

Neottia cernua (ladies' tresses). Sept. 3, 1821. Côte St. Paul. (Spiranthes cernua, Torrey, J. B.)

Arethusa bulbosa. July 5, 1822. Swamp, Three Rivers.

" ophioglossoides. July 5, 1821. Swamp, Three Rivers. (Pogonia ophioglossoides.)

Calypso borealis. May 25, 1822.

Cymbidium pulchellum (grass-pink). July 14, 1821. Savanne. (Calopogon pulchellus.)

Atalaxis liliifolia. July 14, 1821. Savanne. (Liparis liliifolia.)

Cymbidium odontorhizum. July, 1822. Papineau Wood. (Corallorhiza odontorhiza.)

" corallorhizum. June 4, 1821. Savanne. (Corallorhiza innata.)

Cypripedium arietinum. June 4, 1821. Savanne.

" humile (low ladies'-slipper). June 2, 1822. (C acaule.)

" spectabile (gay ladies'-slipper). June 25, 1821. Mountain-swamp.

" pubescens (yellow ladies'-slipper). June 4, 1821. Savanne.

" parviflorum (small yellow ladies'-slipper). June 4, 1821. Savanne.

Iridaceæ.

Sisyrinchium anceps (blue-eyed grass). June 11, 1821. Common in fields. (S. Bermudiana, J. B.)

Smilaceæ.

Smilax peduncularis. June 25, 1821. Mountain.

Trillium grandiflorum (wake-robin). May 14, 1821. Gulley at Tanneries, Mountain, &c.

" pictum. May 26, 1821. Papineau Wood. (T. erythrocarpum, Michaux, Gray, J. B.)

" cernuum.

" erectum. May 15, 1821. Papineau Road.

Medeola Virginica (Indian cucumber). June 11, 1821. Swamp, Mountain.

Liliaceæ.

Convallaria angustifolia (Solomon's seal). May 26, 1821. Papineau Road. (Polygonatum biflorum, Ell., Gray, J. B.)

Convallaria bifolia. June 11, 1821. Mountain. (Smilacina bifolia, Ker, var. Canadensis, Gray, J. B.)
" polygonatum. May 30, 1821. Mountain. (Streptopus roseus. Michaux, Gray, J. B.)
" racemosa. June 17, 1821. Mountain. (Smilacina racemosa, Desf., Gray, J. B.)
" stellata. June 4, 1821. Savanne. (Smilacina stellata, Desf., Gray, J. B.)
" borealis. June 4, 1821. Savanne, et aliis. (Clintonia borealis, Raf., Gray, J. B.)
Allium Canadense (wild garlic), Kalm. July 3, 1821. Island above Nuns' Island.
Lilium Philadelphicum (wild orange-lily.) (L.) J. B.
" Canadense (Canadian lily). 1820. Laprairie.
Erythronium dens-canis (dog's-tooth violet). May 5, 1821. Mountain. (E. Americanum, Smith, J. B.)

Melanthaceæ.

Uvularia grandiflora (large bell-wort). May 15, '21. Papineau Road.
" sessilifolia. May 15, 1821. Papineau Road.
Veratrum viride (white hellebore). July 5, 1821. Three River's swamp.
Tofieldia glutinosa. Cleghorn's, Quebec. June 28, 1827.

Pontederiaceæ.

Pontederia cordata (pickerel-weed). July 27, 1821. Mouth of River Saint Pierre.

Gramineæ.

Zizania clavulosa (Indian rice). July 27, 1821. River St. Pierre. (Z. aquatica.)

Equisetaceæ.

Equisetum arvense (mare's-tail).
" palustre.
" limosum.

Filices.

Polypodium vulgare. August 7, 1821. Mountain.
Struthiopteris Pennsylvanica. July 3, 1822. Papineau Woods. (S. Germanica, J.B.) (Ostrich-fern).
Pteris gracilis. June 15, 1822. Mountain. (Allosorus gracilis, J. B.)
" aquilina (brake). August 2, 1821. Common.
Adiantum pedatum (maiden-hair fern). June 25, 1821. Mountain.
Asplenium rhizophyllum. April 30, 1822. Cleghorn's garden; originally from St. Helen's. (Camptosorus rhizophyllus, J. B.)
" thelypteroides. July 17, 1821. Mountain.
" augustifolium. June 25, 1821. Mountain. (Asplenium Filix-fœmina, J. B.)
Athyrium bulbiferum. June 25, 1821. Mountain. (Cystopteris bulbifera.)
" Thelypteris. Aug. 11, 1821. Gregory's Meadows. (Aspidium Thelypteris, J. B.)
" ———. July 16. (Cystopteris fragilis, Bernh.)
Aspidium dilatatum. Oct. 3, 1820. Papineau Wood. (A. spinulosum, var. dilatatum, Gray, J. B.)
" cristatum. June 16, 1821. Papineau Woods.
" Goldianum. June 15, 1822. Mountain. From Mr. Goldie.
" marginale. June 16, 1821. Papineau Woods.
" acrostichoides. Sept. 18, 1821. Mountain.
" ———. June 16, 1821. Papineau Woods.
Onoclea sensibilis. Aug. 2, 1821. Papineau Woods.

Woodsia hyperborea. August 7, 1821. Mountain.
Osmunda regalis (flowering-fern). August 11, 1821. Wood beyond Gregory's.
" *interrupta.* June 16, 1821. *Papineau Woods.* (O. Claytoniana.)
" cinnamomea. June 11, 1821. Mountain-swamp.
Botrychium gracile. June 25, 1821. Mountain (B. Virginicum.)
Lycopodiaceæ.
Lycopodium dendroideum. June 16, 1821. Papineau Wood.
" clavatum (club-moss). July. Papineau Wood.
" lucidulum. Oct. 3, 1821. Papineau Wood.
" complanatum. Woods north of Papineau Road. July 3.

ARTICLE VII.—*Geographical distribution of the Genus* ALLIUM *in British North America.* By GEORGE BARNSTON, Esq.

(*Presented to the Natural History Society of Montreal.*)

In the October number of this journal enquiry was made as to whether the onion may not be a native of the north or north-western parts of America, and report was made of onions (of course the garden onion) having been brought from a place y'clept "Le Jardin du Diable," situated on the borders of Lake Temiscamingue. The querist surmises, on such grounds, that the onion may be indigenous in the North-west territory; and strengthens his views by a quotation from Sir Alex. McKenzie's voyages, that on the banks of McKenzie's River "there was plenty of wild onions."

Premising, in the first place, that the voyageur understands not exactly the onion of the gardens to be meant, when the term "wild onions" or "oignons sauvages" is used, but any species of the onion that may be met with in the different portions of the country travelled through—in which general sense I have no doubt it was employed by Sir Alex. McKenzie—I shall proceed to shew, as far as can be determined from the labors of botanists up to the present date, what are the various species of the genus *Allium* that have been found on this continent, from the temperate latitudes up to the frozen zone. I shall endeavour to group them also, according to the different districts of country which the species themselves seem to prefer, in hopes that thus a more distinct idea may be formed of their geographical distribution.

The two southern species of the *Allium*, well described by Gray, are *A. striatum* and *A. tricoccum.* The former possesses long linear leaves, striate on the back, with an obscurely triangled

scape; the latter has the leaves flat, and lance oblong. Neither, therefore, can possibly be confounded with the *Allium cepa*, the true garden onion.

Allium cernuum and *A. Canadense*, somewhat more northern species, are also sufficiently distinct. The former has the leaves linear, sharply keeled, a loose or drooping umbel of rose-colored flowers, borne on an angular scape; the *A. Canadense*, well known in this province, has also the leaves linear, and the flowers of a pale rose color.

Allium Schœnoprasum (the Chive) is met with from the shores of Lake Huron and Lake Superior as far as Great Bear Lake in a northerly direction, and along the banks of the streams to the Rocky Mountains, westwards. Douglas and Dr. Tolmie also obtained it on some of the tributaries of the Columbia. It is the only Allium which we discern in this latitude as crossing the whole breadth of the continent, or we should rather say acquainted with the waters of the Columbia as well as of the St. Lawrence. Latterly it has been looked upon as the same plant as the *A. Sibiricum;* in which case we may allow it a still greater extension than Europe and North America, and almost admit that it encircles the globe in the northern temperate zone. Its mode of growth, its deeply colored sepals, and other specific characters, separate it from *Allium cepa* as well as from others of its genus. We cannot but admire the acute discrimination of the botanist, whether Linnæus or another, who first gave the specific name. Whoever has plaited rushes on the springy brae, whether in the form of garters or fools-caps, or baskets for gowans, will admit that he was no goose that gave to Chive its specific name; and whoever has been a year at college will own that there is no language so well adapted as the Greek for giving a combination of ideas in one epithet or term. To resume our subject, we come to our fourth section.

Allium stellatum and *A. reticulatum* (the latter being probably the *A. angulosum* of Pursh) are plants common to the plains of the Saskatchewan, but have been also found, it is said, on the north-west coast. Their non-occurrence on the plateau westward of the Rocky Mountains, between that mighty range and the volcanic ridges of Mounts Rainier, St. Helens, Hood, and Jefferson, may be accounted for by the dryness of that region, the sandy wormwood plains of the middle country possessing an atmosphere in many situations as arid as the steppes of Tartary.

As soon as the descent is made towards the Pacific, where the moist ocean breezes have play, and deposit their humidity, the *A. stellatum* and *A. reticulatum* resume their place in the western flora. They have linear leaves, and are certainly specifically distinct from the garden onion.

Two other species yet remain to be noticed, the *A. acuminatum* and *A. Douglasii*. The former keeps, as far as we yet know, to the north-west coast; the latter is found there also, but has been likewise discovered on the Shoshonee or Snake Indian lands south of the Blue Mountains, an inland district. They both possess rose-colored flowers, and their umbels are loose or patent.

We thus perceive that the species of the Allium or Garlic genus, hitherto discovered in North America, have no more to do with the garden onion than the garlic or chive themselves. Yet when met with by the voyageur they are called, indiscriminately, "oignons sauvages," or, if he speak English, "wild onions." When the boats' crews are grouped together round a camp fire, if any of the party have picked up a few of these savoury little bulbs, with which to regale his mess, a very earnest discussion will sometimes arise as to the comparative merits of the "oignons sauvages." Should one of the crew have ever had the good fortune to handle a spade or weeding-hoe in the gardens of Canada, he immediately becomes the savan of the circle, and after due inspection may, with a grave countenance, pronounce the onions to be *ciboullettes*. If they be small and cylindrical, with hollow leaves, he is actually right, and they are luxuriating on the *A. schœnoprasum*. This is the extent of the voyageur's knowledge of onions; and I believe that the intrepid and persevering Sir Alex. McKenzie merely spoke as a voyager, adopting the phraseology of his canoe-men when talking of these native species. All difference or argument about species is summarily settled amongst voyageurs by the irrefutable conclusion, "Ils sont tous des oignons sauvages."

The scientific botanists, Richardson, Douglas, Drummond, Tolmie, and Gairdner, who traversed the country to the northward, have never given the slightest hint of the *Allium cepa* being a native. Had it been to be met with, it could not possibly have escaped their observation. It is not a plant of the morass or inaccessible mountain: it would have been found with its congeners on the banks of rivers, or in plains where the soil was rich, or fertilized to a certain extent by alluvium. Its discovery as an

indigenous plant of this country would also have been considered as worthy by these men of signal and particular note. But, as far as I know, we have not a word on the subject.

The onion, we are led to understand, has been from remote ages a famed plant, and a highly prized pot-herb. It was cultivated and held sacred by the Egyptians. The Roman satirist exclaims, "Who knows not the superstitions of the crazy Egyptian, that it is with him an impiety to hurt or bite the leek and onion. Oh! holy people, whose gardens give birth to these deities." An Egyptian would take an oath by garlic or onions as he would by his gods.

The Greeks must have held all of the garlic tribe in very high estimation, but in quite a different way from the Egyptians. A philosophizing genius enabled the Greeks to struggle hard against absurdities, and take vantage-ground for the freedom of intellect. They had their *Skorodophagi* or garlic eaters, their *Krommuophagi* or onion eaters, and their *Prasophagi* or leek eaters. We may say, then, that the refined Greeks had, as respects vegetables, a combination of Spanish, French, and Welch tastes.

Among the Romans a love for these bulbs also prevailed, and sometimes to an intense degree, if we put full faith in the expressions made use of respecting them. "*Si porrum et cepe trucidas*," says the Roman gentleman and poet, whose idea is best explained perhaps by the translation: "If thou art devouring the leek and onion." And has not the same roguish *bon vivant* written a whole ode in execration of garlic, because he had partaken too largely of it, as well no doubt as of other good things, at a banquet? The fact appears to be that Horace, finding he had hurt his stomach by a surfeit, humourously clokes his failing, and amuses himself by a philippic against the unlucky garlic, which, coming uppermost, reminded him of his excess. In all likelihood it had only been an ingredient of a dish, and had only lent its attraction to some too luscious dainty. They were accustomed to pound or bruize the garlic when preparing it for the table: "*Pistillo fragrantia mollit allia.*"

The reputation of this genus, being of such preëminence amongst the nations of antiquity, will, I trust, excuse me for having thus enlarged upon the subject. It may still interest some readers to bring together a few opinions regarding the etymology of the botanical name of the onion. Some give the Celtic word *All*, meaning hot or burning, as a derivation for *Allium*; but

whatever may have been the primary root, the Romans, who were much better acquainted with the Greeks than with the Celts, must certainly have taken the word from the Greek, *Aglis*, which in the plural, *Aglites*, was the term used for the root or cloves of the garlic. We find the *g*, which was omitted by the Romans, still retained in its soft form by the Italians in their word for the same plant, *Aglio*. In French it becomes *Ail*, in Spanish *Ajo*, and in Portuguese *Alho*. This accordance in name may lead us to infer that either the Romans themselves introduced the garlic into their western provinces, or that it had been perhaps taken there before their conquests by Greek mariners, who would have the cloves or root on board their vessels, both as an article of food for themselves, and for traffic with the natives. Garlic was an indigenous plant probably in Lower Egypt, as well as in the islands of the Eastern Mediterranean.

Cepa, the specific name of the onion, and by which it was known separately by the Romans from the Allium or garlic, has the appearance of a Greek extraction also; *Kephalis* being the term applied to the head of flowers, prevailing in all the plants of the kind. The *Keph* becomes *Cep* from the softening of the consonant before *e*. The modern Italian here also approaches nearer the Greek than the Latins did, and we have *cipollo* in Italy at the present day, instead of *cepa*. The Celtic *cep*, meaning a head, may be the primary root; and, if we rely on this etymology, the onion or *cepa* may be considered to have derived its name, either from having been looked upon as the principal of its kind, or from possessing the most perfect capitulum or head of flowers. Its habitat was probably more extended than that of garlic, passing perhaps from the Mediterranean islands into northern Greece. A good European flora would shew if this supposition were correct.

The Gothic and Saxon races do not seem to have followed the Latins in their names for these vegetables; but, adopting their own word, *Lœk*, *Look*, or *Lauch*, as a general term, affixed to it some other word denoting what appeared most characteristic in the species they wished to particularize. The leek or *prason* of the Greeks, the *porrum* of the Romans, and *poireau* of the French, was familiar to them. Instead, therefore, of introducing the soft language of the south, they vigorously applied the firm articulations of their own tongue in combinations, to express new ideas, or name new objects as they presented themselves. This rule has not held, however in the case of the shallot, which,

being probably of later introduction to the northern countries of Europe than others of its genus, and only cultivated in the gardens of the rich, kept amongst the Germans the southern name given to it unchanged.

In closing these observations on the onion or garlic genus, and returning to the point of enquiry first touched upon, I can say that my own belief is that the onions from the banks of the Temiscamingue Lake, if really garden onions, must be descendants of some that have been cultivated on that spot by the Jesuits, or perhaps some shanty-men or intelligent Indians once located there. In these old Jesuit gardens, flowers of Europe have been found perfectly naturalized, which must have been first introduced by the early pioneers of civilization. These floral bequests, after nearly one hundred years of neglect, have still, by the favor of nature and advantageous situation, kept their solitary hold, beautiful mementos of the pursuits and recreations of the most intelligent of the first enterprising settlers in the land.

ARTICLE VIII.—*On the Generation of Sounds by Canadian Insects.* By GEORGE GIBB, M. D., M. A., F. G. S., Member of the Canadian Institute, &c.

(*Presented to the Natural History Society of Montreal.*)

Among the most striking peculiarities associated with the study of insect life, which very early attracts the attention of the young entomologist, are the various musical or other sounds and notes which are emitted by many of the genera among the different families of this division of the animal kingdom. In my youthful days I used to listen with an exciting interest to the tuneful song of the Tree-hoppers, *Cicadæ*, in the extensive gardens of Mr. James E. Campbell, my maternal grandfather, situated at the foot of the Current St. Mary, on the beautiful Island of Montreal. I watched whence the music proceeded, and stopped not until my curiosity was ultimately rewarded with the capture of one of these insects, which have been celebrated from time immemorial, and described by Virgil as rending the bushes with their song:

> " Et cantu querulæ rumpent
> arbusta cicadæ."

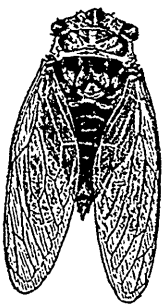
The insect sang as it was held between my fingers, and it was from the possession of this specimen that my taste for collecting insects at an early period was formed. It was not long subse-

quently to this that a fine large beetle of a fawnish-drab colour, the *Monohammus confusor* * rewarded my efforts, and the utterance of a very delicate, but still quite audible squeak like that from a mouse, only not so loud, astonished me very much. This sound continued for hours, whenever the beetle was disturbed, notwithstanding a pin had been passed through one of the elytræ. As my collection increased, many other beetles were discovered to emit similar sounds of varying intensity. But the loudest and most striking note of this kind given forth by an insect, was from a very beautiful and rare species of sphinx, the *Sesia Pelasgus* or Humble-bee Hawkmoth, and although my collection numbered but one similar specimen given to me, I retained the one which was captured by myself for some time alive to hear its murmurs.

The sounds generated by Canadian insects were never disregarded in my entomological rambles, and it is with a view of drawing the attention of my younger readers to this interesting subject, that I venture to put together a few remarks, which shall embody a brief description of the sounds, and an enumeration of the principal insects which produce them. And here I must be excused for a moment, if I refer back to that period of youth, when all is sweet and joyous, when neither thought, nor care troubles the mind, and nought interests for the time but the ardent pursuit after the studies of nature. It is with feelings of ever cherished recollection that my mind dwells upon my rambles and their connecting incidents over the various parts of my native island, which, perhaps, are agreeably forced upon one during a sojourn in another and a distant land. My insect collecting days are not likely to be resumed in this country, and with a view to preserve the records of my early labours, the great bulk of my collection is now deposited in the Museum of the Literary and Philosophical Society of St. Andrew's, in Fifeshire, the country from whence my paternal ancestors came.

Of the Canadian insects which emit sounds, unquestionably the most remarkable is the *Cicada* or Tree-hopper, which sings loudly during the hot months of summer, and in some localities, especially in large gardens, and groves of bushes, exists in great numbers. Its shrill chirping may be heard during the greater part of the day, when the sun is shining, and the insect may be found sitting on the leaves or small branches of trees, or occasionally on the fences, in all of which situations I have captured them.

* Common in August about the Wood-yards of the city.—Eds.



Tree-hopper. *
(Cicada canicularis.)
Natural size.

Drums of Tree-hopper.
a a the outer drums; *b* the muscular strings; *c c* the inner drums.

This insect is not a grass-hopper, as its name is erroneously translated from the writings of Pliny and others, but belongs to the first family of the Homopterous Hemiptera. It has a pair of transparent wings and wing covers, and a shining black body; the largest Montreal specimens measure 3 inches and 3 lines with extended wings, and the body 9 lines and-a-half. Their general expansion is from $2\frac{1}{2}$ to $3\frac{1}{4}$ inches, and the veins of the wings are of a green and orange colour. They are not found in such large numbers in Canada as in the United States, where it is said such immense numbers are sometimes congregated, as to "bend and even break down the limbs of trees by their weight, and the woods resound with the din of their discordant drums from morn to eve." On the most careful comparison between the Canadian and European species of this insect, I find there is not the slightest appreciable difference in the formation of the musical instrument or particular organ, which is present in the males only on each side of the base of the abdomen, by means of which is produced a sort of monotonous and noisy music, which has led to their being termed by many authors "chanteuses" or singers.

It consists of 2 pairs of large plates fixed to the trunk between

* Several species of *Cicada* inhabit the United States and Canada. The Larvæ live under ground on the roots of trees to which they are occasionally injurious. Dr. Harris in his treatise "On Insects injurious to Vegetation," gives an interesting history of the above and several other species.—Eds.

the abdomen and hind legs, these form a large exterior moveable cartilaginous curtain or membrane, which, when raised, exposes a cavity, part of which seems to extend into the abdomen, and part to be covered with a second thin and pellucid membrane, much more delicate than the exterior one, and tensely stretched, plicated, and iridescent. In the middle there is a horny plate running horizontally across the bottom. It is this iridescent membrane which is acted upon internally by a bundle of muscular strings which throw it into rapid vibration, and thus gives rise to the sound. These minute muscular strings are attached by one extremity to another membrane in the interior, which is presumed to be the true drum, from the fact, that when Réaumur*, who is describing the mechanism of the sound produced, compares it to that issuing through an opening like that of the larynx of quadrupeds, or the sound-hole of a violin.

This most curious apparatus has attracted the attention of many of the most celebrated physiologists, and a desire is manifested on the part of some of them to know whether any actual difference exists in its construction in *Cicadæ*, existing in other parts of the world besides Europe. As Greece and Italy are the two countries in which it abounds, the familiarity with its history evinced by Anacreon, Aristotle, Pliny, Virgil, and some other ancient authors is fully explained. There can be no doubt that Aristotle refers to the Cicada, when he speaks of the voices of insects, especially of "a shrill, long-drawn note, like the grass-hopper." Pliny speaks of the Cicada, but there is no doubt that he, as well as Aristotle has confounded grass and tree-hoppers together.

Whether the sound is pleasing to the ear is a question; assuredly when it proceeds from a number, its shrillness and frequent repetition becomes fatiguing. I cannot say that it was displeasing to myself, perhaps because my curiosity was amply repaid by its capture and examination of the insect, and because I wondered, in common with others, that such a shrill and loud sound should proceed from such a small creature: its music being more audible than that of many birds. In the forests of South America at certain periods of the day nothing is heard but a loud and uninterrupted rustling or humming noise, produced by various insects, in which the notes of the Cicadæ predominate. Kirby and Spence mention on the autho-

* See Cuvier's Animal Kingdom 1849, page 569 for a more minute and strictly anatomical account.

rity of Captain Hancock, that the Brazilian Cicadæ, sing so loud as to be heard at the distance of a mile, which is as if a man of ordinary stature possessed a voice that could be heard all over the world. That its voice is very much louder than our Canadian species, may very well be understood, when it is remembered that the Brazilian Cicada is a much larger species, and I am informed that its drum is similar to the one which has been described. The use of the music, as in crickets, and other insects, is for the the purpose of attracting the female sex, and it conclusively shows that if the precise organ of hearing has not been definitely recognized in them, it at any rate is most assuredly not absent. Newman has observed, "to what purpose would the merry cricket sing his evening song, if there were none of his kind to listen to and admire it?"

Any one who has walked across a Canadian meadow or pasture land, in the summer time, or over a hay field, particularly after the hay has been cut and removed, must have observed the countless numbers of grass-hoppers, locusts, crickets, and other insects, which hop across his path, and produce with their united voices a chirping noise not easily forgotten. Some of the locusts possess yellow wings with a black border, and as they fly, produce a sort of loud snapping noise, which is very peculiar.* This is produced by the attrition of the anterior pairs of wings against each other, one of the nervures being furnished with a rough file-like edge, which is made to pass over the nervures of the opposite wing; and the sound is augmented by the resonance of a certain part of the wing, that is surrounded by peculiarly strong nervures, between which the thin membrane is tightly stretched, so that it acts as a tympanum or drum. In other species of Canadian locusts there exists on each side of the body near the base of the abdomen, a large cavity, closed on the inside by a very thin pellicle, which has some influence in the production of chirping, or possibly as has been supposed in flight. It is in this respect analogous to the tree-hoppers, and may be compared to a kind of tambour or drum. The opening left by the pellicle, which answers the purpose of a lid, is crescentic in shape, and at the bottom of the cavity may be seen a white membrane shining like a mirror

* This insect is called the Rattling Locust *Œdipoda sulphurea*, and possesses dusky elytræ. I have noticed the wings vary in colour, but the yellow are the commonest with a black border.

and tensely stretched. The apparatus as described by De Geer, may be seen in the second volume of the Pictorial Museum of Animated Nature, page 340. Fig. 3389.

Many varieties of the grass-hopper and locust may be captured in the gardens and fields, and of a considerable size; some of them are destitute of wings, but all are capable of making their own peculiar noises. In a case of South American insects once in my possession there is an immense brown bodied locust, whose extended wings measure 7 inches, the length of the body being 4 inches. It is an example of *Acrydium Latreillei*, the upper wings are green and the lower deep red, bordered with brown, the legs green.*

The noise of the flight of an immense swarm of these locusts in South America has been compared by Mr. Darwin to a strong breeze passing through the rigging of a ship. The noise occasioned by whole armies of locusts, by the mere act of mastication alone, when incalculable millions of powerful jaws are in action at the same time, has been likened to the crackling of a flame of fire driven before the wind.

The Canadian student will be well repaid, by collecting all the varieties of the locusts and grass-hoppers, which abound on the Island of Montreal.

As belonging to the same family as the locusts and grass hoppers, may be mentioned the Canadian crickets, the males of which call their females by making a chirping noise, produced as in many of the grass-hoppers by rubbing the inner part of the wing-covers like a talc-like mirror, against each other with rapidity, and sometimes by a similar alternate motion of the hind thighs against the wings and wing covers, the thighs acting as part of the bow of a violin. The last I suspect is the common practice with crickets, whose song is heard with so much regularity in the night time. The number of chirps uttered I have counted with my watch, and find it to be 76 per minute, the standard of the healthy pulse, but if any noise be made, the chirps increase to 100, very seldom more. The field cricket *Gryllus compestris*, is of a black colour and may be heard in the fields at all periods of the day, where they may be found of all sizes hopping about. The song of the house cricket, *G. domesticus*, is to be heard in every well

* This magnificent case, containing about 250 specimens of exotic and other insects, many of great rarity and beauty, I presented to the Literary and Philosophical Society of St. Andrew's.

regulated Canadian hearth in the evening or twilight, and although it is said not to be so soft as the song of the mole cricket, which I have never met with in Canada, it is by no means disagreeable, although I must confess it is sometimes rather harsh Opinion varies on the "vulgarly called song of these animals," for I find Milne Edwards, of whom I had expected better things, calls it a sharp and disagreeable sound, which explains the origin of their vulgar name of *cri-cri*. The author of the "Backwoods of Canada," is also evidently no admirer of the *Gryllus*, for she says—"The very crickets, that used to distract us with their chirping from morning till night, have forsaken their old haunts." But this is excusable, for a sad inroad was made by these insects into the fair author's clothes and woollens. To study the habits and song of the Canadian cricket, a good plan would be to keep a number in cages, as practised by the Spanish peasantry, who delight in its querulous chirping.* Among many people the chirp of the domestic cricket is considered a good omen, and its absence from a French Canadian hearth produces some anxiety. Although not influenced by anything of this kind, I do entertain a partiality for the cricket's chirp, which I have been accustomed to hear with satisfaction from childhood.

All the known species of the *Mantis* are proper to America, but by the species of *Phasma* † which I have captured on the slopes and base of the Montreal mountain, I have not noticed that any sound was produced, notwithstanding that some species, as the *Praying Mantis*, are said "to carol forth a fine canticle."

I have observed that many beetles, particularly the large drab with long antennæ (*Monohammus*), emitted a distinct but slight sharp sound, which is attributed to the friction of the peduncle of the base of the abdomen against the inner recess of the thorax, when they alternately enter and withdraw it. The rubbing of different parts of their dense integument against each other, is, however, the general explanation of these sounds in beetles. This may be the case in many of them, but I think there are, in some, true respiratory sounds, that is to say, while at rest sounds are emitted from some of the spiracles which answer the

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* My readers will doubtless remember the quarrel between two boys respecting a cage full of crickets, which gave Don Quixote so much annoyance, but which was ended by the worthy squire making a purchase of the chirping brood for four farthings.

(† *Spectrum femoratum?*—Eds.)

purpose of the larynx in higher animals, when the insect is motionless. In the cock chafer, which soon makes its presence known in the evening, by the noise it makes in flying about a room, the sounds are likely due to currents of air directed to some of the spiracles which exist at the interspace between every two segments of its body, as in common with the other coleoptera.

Lest it might be thought that I had overlooked the sound produced by the *Anobium*, a small beetle that burrows in old timber, I will merely give it the passing notice, that its tick, which has procured for it the name of the *death-watch*, is totally unconnected with the respiratory system, and is produced by rapping its head against the wood work, and if the signal be answered, it is continually repeated. Its noise resembles a moderate tap with the nail upon the table, and this imitation will be answered by the insect, as if the real sound of its own kind. When I first heard the death-watch, I was told it was a very bad sign, and that it portended the dissolution of some relative! The superstitious notions which prevail regarding this harmless beetle, are preposterous, but at the same time have done much mischief. The reader (especially the superstitious one) is referred to the description of the death-watch in Maunder's Treasury of Natural History.

Among the Lepidoptera—the butterflies of which those common to Canada have been so ably illustrated in the pages of this Journal, I have heard a stridulous sound emitted by many species of the sphinx or hawkmoth tribe, captured generally in the evening twilight. This sound is something like the squeaking of a mouse or a bat, and was strikingly pronounced in a beautiful and rare specimen of humble-bee hawkmoth, the *Sesia Pelasgus* with reddish brown wings and hyaline disks, taken in the gardens of Mr. James E. Campbell, at the foot of the Current St. Mary. This squeaking noise continued as long as the creature remained alive, and was much louder than in any other of the numerous sphinges it was my good fortune to capture. It is a well-known fact that when the death's head sphinx, *Sphinx Atropos*,* common to England, is in the least irritated or disturbed, it emits a similar sound, and it is related that from this circumstance, together with the presence of a very large patch, exactly resembling the usual figure of a skull or death's head on the top of the thorax, it is held in much

* A very perfect specimen is in the Museum of the Natural History Society, presented by the writer.

dread by the vulgar in several parts of Europe, its appearance being regarded an ill omen, or harbinger of approaching fate. With the Death's-head moth, this sound is given out when confined or taken into the hand, and is likened to the cry of a mouse, but is said to be more plaintive and even lamentive.

The humming noise of many, if not of most of the Canadian sphinges, some good specimens of which were in my collection, is distinctly heard during their rapid flight, but it is again different from the stridulous and plaintive note emitted by them when stationary. The mode in which this sound is produced has not as yet been correctly ascertained. It has been supposed by Reaumur to be caused by rubbing the palpi against each other, and by Lorey to be owing to the rapid escape of the air from the two ventral cavities. On carefully considering the matter, there cannot be any doubt that the sound is connected with the respiratory organs, but in what manner it is produced, will probably never be ascertained. I have no doubt if attention is paid to this point, that one or more of the Canadian species may be found to emit the sound *before* quitting their pupa-case, as Mr. Raddon found with the Death's-head moth.

Although it is not always easy to detect the mode of production of the sounds generated by different tribes, we have no difficulty in rightly attributing the buzzing and humming noises heard during the flight of the dipterous and hymenopterous insects, to the forcible expulsion of the air as it streams through the respiratory spiracles. The experiments of Burmeister on bees and flies show that the noises are not so much produced by the simple motion of the wings, to which it is commonly attributed, as by the vibrations of a little membranous plate, situated in each of the posterior spiracles of the thorax; for if the apertures of these be stopped, no sound is heard, even though the wings remain in movement. These are the true vocal organs, although the full-toned buzz is increased by the action of the wings; yet many of the species, as the wasp-fly for instance will buzz when at rest.

The buzzing of the gad-fly *Tabanus* is familiar to horses and cows*, which are sometimes covered with blood from its attacks. The shrill trumpet of the musquito gives us warning of the proximity of that insect, which pursues us in many parts of Canada, thirsting for our blood. The buzzing of numerous flies, including

* The horse gad-fly *Gastrus equi*, whilst that affecting sheep is called *Oestrus ovis*, or the sheep gad-fly.

countless blue-bottles; the humming of bees, the shrill buzzing of wasps, and the creaking sound of the sawyers, are, I presume too well known to need description. The last of these is the *Tenthredo cerasi* so destructive to many of the fruit trees of North America, and the sound produced by its sawing efforts is entirely mechanical. So also is that of the timber-louse, *Atropos pulsatorius*, which in this respect resembles the death-watch, but belongs to the Neuroptera, and reminds me that the same family includes the celebrated *Termes* or White ants. Ants belonging to the Hymenoptera are well known as domestic pests, from their ravages some times in the well-stored cupboard; and when a swarm of them is dispersed, the only sound emitted for so unceremoniously driving them away, is a distinct and audible kind of a hiss.

I trust this slight sketch of the generation of sounds of insects, heard for the most part on the Island of Montreal, may prove not only of interest, but be the means of drawing attention to the subject. Many of them are not only exceedingly shrill, but can be heard at a considerable distance, and with every propriety the organs producing them in nearly all the insects which have been noticed, may be considered as the analogues of the larynx and trachæ in the higher animals. I am of course at issue with the immortal Cuvier on this point, as he has remarked that the various noises made by insects are in reality *not* the voice; because, he says, the air does not pass through a larynx. If the numerous spiracles are for the purposes of respiration, a fact indisputably established, and that the air is known to rush in and out of some of them, then they are the analogues of the larynx, and simulate its functions, as much so, as the circulation in insects is the counter-part of the same function in the vertebrata. And I will close with the question of Pliny on this subject, who asks—"And where too, has nature implanted that sharp, shrill voice of the creature, so utterly disproportioned to the size of its body?" to which I reply, that in the majority of insects, it is in the spiracles, or representatives of the larynx in higher animal life.

London, September, 1858.

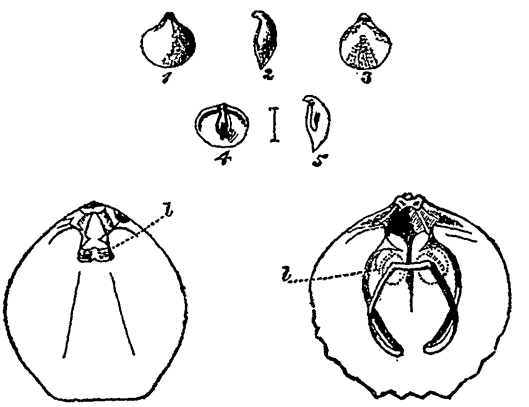
ARTICLE IX.—*On some new Genera and Species of Brachiopoda, from the Silurian and Devonian Rocks of Canada.* By E. Billings, F.G.S. Read before the Natural History Society of Montreal, 28th March, 1859.

(*From the Report of the Geological Survey for* 1858.)

Genus Centronella, Billings.

Generic Characters.—Shells, having the general form of *Terebratula.* Dorsal valve, with a loop consisting of two delicate riband-like lamellae, which extend about one-half the length. These lamellae at first curve gently outwards, and then approach each other gradually, until at their lower extremities they meet at an acute angle; then becoming united they are reflected backwards towards the beak in what appears to be a thin flat vertical plate. Near their origin each bears upon the ventral side a single triangular crural process. Name from the Greek, *Kentron,* a spur. This genus is intermediate between *Terebratula* and *Waldheimia.* In the former the loop is short, not exceeding greatly one-third the length of the shell and not reflected. In the latter it extends nearly to the front and is reflected but the laminae are not united until after they are folded back.

The following figures will explain the difference more clearly:



6 7

Figs. 1, 2, 3. Ventral, side, and dorsal views of *Centronella glansfagea.*

" 4. Interior of dorsal valve, shewing the loop.

" 5. Longitudinal section, shewing the position of the loop in the interior.

" 6. Interior of dorsal valve of *Terebratula.* *l*, the loop.

" 7. Interior of *Waldheimia.* *l*, the loop.

CENTRONELLA GLANS-FAGEA, (Hall, Species.)

Rhynchonella glans-fagea, Hall. Report of the Regents of the University of the State of New York, 1857. Page 125.

Description.—Shell, small, smooth, broad oval or rather subrhomboidal, greatest width near the centre of the length of the dorsal valve, from which point the sides slope in nearly straight lines to the beak where they meet at an angle of about eighty-five degrees; front rounded or sometimes either a little pointed or slightly sinuated. Ventral valve the larger, its outline forming a nearly regular arch from the beak to the front margin, strongly and broadly subcarinate along the centre, beak very prominent and projecting over the dorsal valve at a right angle but not much incurved at the point; an open foramen beneath it. Dorsal valve somewhat flat, a wide shallow concavity extending from near the beak to the front where it gently elevates the margin of the ventral valve. Length from two to four lines, width about the same.

This little species is somewhat variable in form, the length being sometimes greater than the width, and often a little less. The broad shallow mesial depression of the dorsal valve sometimes extends nearly to the beak, and in other specimens dies out at two thirds the length. The detached dorsal valves also exhibit two very thick and strong supports for the loop and between them a deep fissure open to the beak.

Locality and formation.—Oriskany Sandstone, near Cayuga, C. W. Corniferous limestone at Rama's farm, near Port Colborne; abundant. In the State of New York it occurs in the Schoharie Grit.

Genus STRICKLANDIA, Billings.

Generic Characters.—Shell, usually large, elongate oval, transversely-oval, or circular, sometimes compressed; valves nearly equal; a short mesial septum in the interior of the ventral valve supporting a small triangular chamber beneath the beak as in *Pentamerus;* in the dorsal valve no longitudinal septa spires or loop, the whole of the internal solid organs consisting of two very short or rudimentary dental plates, which in some species bear prolonged calcified processes for the support of the cirrated arms. In all the species the ventral valve has an area more or less developed.

This group of shells, although closely related to *Penta-*

merus, differs from that genus in the following particulars:—1st. In *Pentamerus* the form is globular and the ventral valve is much the largest. In *Stricklandia* the valves are nearly equal and never globose. 2nd. In *Pentamerus* the dorsal valve has two or three longitudinal septa, which in some species sustain a small triangular chamber. In *Stricklandia* these characters are entirely absent. It might be thought that the difference between the short or rudimentary dental plates of *Stricklandia* and the elongated mesial septa of the dorsal valve of *Pentamerus* is not of sufficient importance to constitute a generic distinction, because it is only a difference in the extent to which identical parts are developed, the dental plates of the former genus being a rudimentary state of the septa of the latter. When, however, we examine any group of closely allied genera we find that all the grounds for separation consist in the various modifications of the same set of organs. Were it not so then there would be no such thing as homologous parts. The difference in the degree of the developement of an organ is not *always* a good character, but when it is carried to such an extent that the whole form of the animal is affected in a particular manner, manifested in a number of species then it becomes of generic value. If we take the several species of *Stricklandia* and compare them with an equal number of species of *Pentamerus*, such for instance as *P. Knightii*, *P. galeatus*, *P. Sieberi*, *P. acutolobatus*, *P. caduceus*, &c., the difference in the external form of the two groups is so remarkable that we would be almost warranted in separating them into two genera upon this ground alone; but when to the dissimilarity in the general form we add the difference in the internal structure then there can be little doubt as to the correctness of the separation.

This genus includes three English species which have been long known under the names of *Pentamerus lens*, *P. liratus*, and *P. lævis*. All these, and the three Canadian species, abound in rocks of the age of the Middle Silurian, such as the Landovery rocks of Sir R. Murchison, and the Clinton and Niagara groups of the New York geologists. No species have as yet been found either above or below the Middle Silurian. On the other hand, the genus *Pentamerus* occurs more or less frequently in all formations from the Black River limestone* to the Devonian inclusive.

* I have ascertained that *Atrypa hemiplicata* (Hall) is a true *Pentamerus*.

The following figures exhibit the difference in form between *Stricklandia* and *Pentamerus*:—

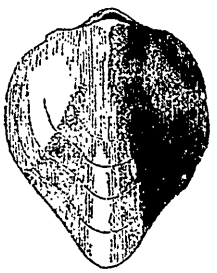


Fig. 8.

Fig. 9.

Fig. 10.

Fig. 8. *Stricklandia lens*, dorsal view.
" 9. do. do., side view.
" 10. *Pentamerus Knightii*, side view.

I am not certain whether Fig. 9 is the true *S. lens* or a variety. It is more pointed in front than any of the English specimens that I have seen.

STRICKLANDIA, GASPÉENSIS, Billings.

Description.—Shell, large, oval; length to breadth about as five is to four; valves about equally convex. The ventral valve has a shallow mesial depression which commencing at the beak in a point gradually enlarges to the front margin, more than half of which is affected by it; the dorsal valve has a corresponding mesial elevation, on each side of which there is sinus of just sufficient strength to induce the idea of a trilobed surface. The two valves are nearly equal, the ventral being the longest by about one line in a specimen five inches in length. The beak of the ventral valve is closely incurved over that of the dorsal and on each side of it there is a short area. The whole surface is covered with strong close rounded longitudinal ribs with rather sharp furrows between. These ribs are on an average one line wide at the front margin.

This species, differs from all the others in its form, which is a nearly perfect ellipse, both ends being about equally rounded and the greatest width being in the centre of the length. The ribs are also more distinctly defined and proportionally more numerous than these of any other species.

The average length is four inches; width three inches and a half; depth of both valves two inches and a half.

Locality and formation.—L'anse à La Vielle. Gaspé Upper Silurian.

STRICKLANDIA CANADENSIS, Billings.

Description.—Shell very large, sub-circular, transversely broad, sub-oval, often much expanded, compressed, surface covered with rather obscure radiating ribs. The form is somewhat variable. Usually the hinge line is straight and two thirds the greatest width of the shell, the cardinal angles rounded, sides gently convex and the front slightly pointed; the ventral valve with a mesial sinus commencing at the beak and gradually enlarging to the front; the dorsal valve with a corresponding mesial fold; both valves about equally compressed convex; radiating ribs obscure one line in width at the front. Average width of adult specimens five inches, length the same or a little less, depth of both valves one inch and a half.

The proportioned length and width varies. In some specimens the sides are so gently curved as to become sub-parallel and in such instances the length is a little greater than the width, but in general the latter dimension is the greatest.

This species closely resembles *S. liratus*, and may perhaps be considered a variety thereof, but at present on account of its great size, I think it a distinct species.

Locality and formation.—In great numbers at Mr. Goodenow's Quarry, near Thorold, C.W., in the Clinton limestone.

(Var.) STRICKLANDIA BREVIS, Billings.

Description.—Transversely oval, rather convex, hinge line a little more than half the width of the shell cardinal angles, sides and front rounded; surface covered with obscure rounded radiating ribs from half a line to one line in width. Mesial fold and sinus obscure width from two inches to two inches and a half; length from one inch and three fourths to two inches.

This form is closely allied to *S. Canadensis* but is proportionally broader and more convex. The fossil figured in the Palaeontology of New York, vol. 2, p. 22, fig. 3, under the name of *Spirifer* —appears to be the same.

Locality and formation.—South West Point, Anticosti, Middle Silurian.

ARTICLE X.—*On the Variable Illuminating Power of Coal Gas;* by WILLIAM E. A. AIKIN, Prof. Chem., &c., University of Maryland.*

(Read before the American Association for the Advancement of Science, at the Baltimore Meeting, May, 1858.)

IN common with a large number of our citizens, my attention was directed some short time since, to a somewhat sudden, inexplicable and enormous increase in the amount of our quarterly bills for gas consumed; an increase equal at times to an advance of a hundred per cent over the corresponding quarter of the preceding year. As it would have been absurd to suppose a simultaneous derangement of all the meters over an extensive district, it was obvious that the difficulty could not lie in any error in the registry of the gas, but in its illuminating power, necessarily requiring the consumption of a greater bulk of gas to produce a given quantity of light. Feeling curious to know how this difference could have occurred, I set myself to work to ascertain, if possible, what causes could be acting to diminish the illuminating power of the gas.

It has long been known that the quality of the gas produced from the fat coals is very materially influenced by the circumstances of the decomposition. In the elaborate experiments made some years ago, on a most extended scale by Hedley, the British Engineer, as detailed in his report to a committee of the House of Commons, we find this subject most satisfactorily discussed. Below a cherry red heat the products obtained by heating coal in close vessels contains hardly any illuminating material. At that temperature it is furnished most freely, but after having been formed is liable to decomposition, involving a loss of carbon by contact with any highly heated surface in passing through the apparatus. Such decarbonization increasing with the degree of heat, with the extension of the red hot surface, and with the time of contact. Again, the duration of heat is most important, the best gas coming over during the first hour, the quality rapidly deteriorating, until at the expiration of four hours the product is worth very little to the consumer, and after five hours may be considered as worthless. But the bulk of such worthless gas that can still be obtained by pushing the process to completion is very considerable, equal sometimes to $\frac{2}{3}$ of all that passes over.

* Cited from Silliman's Journal.

How far any neglect in the observance of the precautions required to produce a proper illuminating gas, may explain the result the public have no means of knowing. All that we know is that the manufacturers furnish an article which they say is the right article and prepared in the right way, and possessing an illuminating power varying from 14 to 17 candles. That is, their engineer reports, that on trial with a photometer, at stated times, the gas burning from a jet, consuming five cubic feet per hour, gives an amount of light equal in the average to that of 15 patent candles six to the pound. The patent candle being ostensibly a mixture of spermaceti and wax. Assuming as true all that is claimed by the manufacturers, it can still be shown that the gas even if properly made and correctly tested may be and is furnished to the consumer in a condition of greatly diminished illuminating power, compelling the consumption of a greater bulk to obtain the required light and consequently swelling the record of the meter and the sum total of the quarterly bills. In my trials to determine the specific gravity of our gas by weighing a globe previously exhausted and then filled with it, I obtained a result ranging from 570 to 580 somewhat below that given as characterizing good gas. But in reality I attach very little importance to this result since the mere specific gravity of such a complex mixture as coal gas can hardly be relied upon to determine its commercial value.

Although good gas certainly has a higher specific gravity than poor, yet the difference could not be taken to represent the true difference in value since the principal components of the mixture hydrogen, carbonic oxyd, light carburetted hydrogen, olefiant gas and other still heavier hydrocarbons having specific gravities, widely different, might vary somewhat in their relative proportions sufficient to affect the illuminating power, without at the same time and to the same extent affecting the specific gravity. The action of chlorine in removing the olefiant gas and other more dense hydrocarbons, the principal light giving materials of the coal gas, showed a per centage of these substances never exceeding 10 per cent. But not having time at the moment to guard against all sources of error in the process, laid it aside. My attention was principally directed to the simple inquiry to what extent will the illuminating power of the gas be impaired by keeping it in contact with water for noted periods. That it does deteriorate when thus kept, or when kept in contact with oil or even close vessels has been long known.

Dr. Ure tells us that gas from oil when first made and with a specific gravity of 1·054 will give the light of one candle when burned from jets consuming 200 cubic inches per hour. But keep the gas three weeks and then to get the same light from the same burner you must supply 600 cubic inches per hour. He adds that with coal gas the deterioration appears to be more rapid. For if such gas when first made will give the light of one candle by the consumption of 400 cubic inches per hour, when kept four days will require the consumption of 460 cubic inches per hour to give the same light. My first attempt to obtain some definite results began on the evening of the 8th ultimo, when I filled a a large receiver from the street main and placed it on the shelf of the pneumatic trough, the next evening I filled a second one and put it alongside of the first, the following evening I filled a third receiver, and still the following evening, the 11th inst., I filled a fourth receiver. On the evening of the 12th I was thus provided with four jars of gas, one of which had been standing 24 hours or one day over the pneumatic trough, this I will call No. 1; another, No. 2, had been standing two days; No 3 had been standing three days, and No. 4 had been four days in contact with the water. The diminution in volume by such exposure was indicated by a receiver graduated to cubic inches into which I introduced 130 cubic inches of gas on the evening of the 8th; on the evening of the 12th this had lost about 10½ cubic inches, indicating a loss of about 8 per cent. of the original bulk.

The effect produced on the illuminating power of the gas by the loss of volume became at once apparent as I proceeded to contrast the value of the flames furnished by the contents of the several receivers, 1, 2, 3, and 4. I used for this purpose the ordinary photometer arrangement, taking the relative intensity of the shadows produced, as a measure of the relative intensity of light. The candle employed for the comparison was the patent candle already referred to, and the burner was the kind known as fish tail burner, which had been previously guaged, and known to consume a trifle more than 5 cubic feet per hour with the average maximum pressure of the gas works. I need hardly add that the burner was the same in all the trials, and occupied exactly the same position. The burner and the screen on which the shadows fell were not moved at all during the experiments. The only adjustment wanted was to bring the candle nearer to or father from the screen, and by beginning with the most luminous

gas the adjustment became simply a gradual withdrawal of the candle.

The capped receiver from which the gas was passed floated freely in a large glass jar, supported in an erect position by the perpendicular sides of the jar, its own weight, with all attachments, making a difference of level between the water around it and that within equal to 3½ inches, a little exceeding the ordinary evening pressure in the gas pipes. This difference of level, and consequently the pressure on the escaping gas, was kept uniform by the spontaneous sinking of the receiver as the gas was consumed, a flexible tube communicating between the stop of the receiver and the gas burner. This arrangement gave me a steady, equable flame, which continued perfectly uniform long enough to enable me, after a few trials, to note, very exactly, its true value. The results as first obtained were too startling to be at once believed, but subsequent repeated trials satisfied me that they were very close approximation to the truth. The first trial was with the gas from the street main, which I found equal to 10·71 candles. The same gas, transferred from the pipe to the capped receiver, and burned immediately, gave exactly the same power, 10·71 candles. Gas No. 1 was next used, and found equal to only 3·50 candles; Gas No. 2, after standing two days, gave the light of 3·20 candles; Gas No. 3, three days old, was equal to 1·90 candles; and Gas No. 4, four days old, gave the light of 1·75 candles—these quantities representing the average of repeated trials.

It thus appears that the illuminating material of our coal gas is so rapidly abstracted by suffering it to remain in contact with water, that the same volume of gas which to-day will give me the light of nearly 11 candles, by standing until to-morrow will give the light of only 3½ candles, and if left standing four days will give the light of only 1¾ candles, while the only means left to the consumer to get the light he requires from this deteriorated gas is to burn more of it, as we have all been doing through the past winter. If we now take into account the well known fact that gas of less illuminating power has less density, and that gas of less density passes more rapidly through a given aperture than gas of greater density we have another cause operating to increase the consumption. In Hedley's experiments the Argand burner which gave the light of 25 candles when supplied with 3 cubic feet per hour of gas from Welsh cannel coal, with a specific gravity of

737, required no less than 7½ cubic feet per hour to give the same light, from the same burner, when the gas was made from the Newcastle coal and had a specific gravity of only 475.

Again, as we diminish the illuminating power of the gas we increase its heating power, and this necessarily brings with a higher temperature given to the burners, a higher temperature given to the gas passing through them, and again an increased rapidity in the flow. It is thus manifested that the public placed in a peculiarly unfortunate position, since all the mistakes that are likely to occur in the process of manufacture are mistakes that must inevitably increase the bills of the consumer and the profits of the manufacturer. If the workman fails to raise the heat with proper rapidity, if he overlooks a retort and allows the heat to continue a little too long, if towards the close he allows the heat to rise a little too high, the result is inevitable, the product is deficient in illuminating power. Or if on any one day a little more gas is produced than is legitimately required, the surplus remains in the gasometer to vitiate the supply of to-morrow. To what extent this vitiating action operates may be inferred from the fact that I have never been able to obtain from the gas of our pipes an illuminating power equal to the minimum of that reported by the engineer of the gas company. In my trials the power has varied from that of 13 candles down as low as that of 9 candles, instead of ranging from 14 to 17 candles.

This difference is perfectly intelligible if we assume the last quantities to represent the value of the gas when first made, and my results to represent its value as delivered to the consumer.

In conclusion I would merely add that the difficulty suggests its own remedy. And that would be to have a standard of quality established by the proper authorities, taking the illuminating power as the basis of the calculation, and then to have the requirements of such standard insured by a nightly examination, if necessary on the part of some one entirely disconnected with the manufacture. In other words the photometer can be made as available and as valuable to the consumer of gas as the hydrometer is to the spirit merchant; as he distinguishes with his instrument in any mixture, between the spirit he wishes to buy and the water he is unwilling to pay for, so the consumer of gas can distinguish with the photometer between the true illuminating material and the worthless heat producing gases, hydrogen and lihtg curburetted hydrogen, that make up the bulk the ordinary coal gas.

MISCELLANEOUS.

Inauguration of the New Buildings of the Natural History Society, Cathcart Street, Montreal.

The erection of New Buildings for the purposes of the Natural History Society, has long been an object of earnest desire among its members and friends. For two years efforts have been made to dispose of their old premises, which although valuable as property, were yet in many respects very inconvenient. Not, however, till last year was this found to be possible. An offer then presented itself which was considered suitable, and a sale was accordingly effected. A site having been granted to the Society on favourable terms by the McGill College, steps were immediately taken by the Council to procure plans and estimates for a new erection. This was done without delay Our funds not permitting us to indulge in external architectural decoration, a plain substantial brick edifice was thought in the meantime sufficient. Every attention was, however, given that the interior arrangements should be in every way suitable as regards light, space, and access for our Natural History collection and our Annual Lectures. These objects have been secured in the most satisfactory manner, and it is now hoped that this venerable and valuable Society will meet with that encouragement from the citizens of Montreal which it may justly claim at their hands. There was a large attendance of ladies and gentlemen at the opening soiree. The liveliest interest was manifested by all present in the Society's valuable collection, and the utmost satisfaction expressed at the internal arrangements of the building. It is to be hoped that the attention of our wealthy and liberal-minded citizens will now be directed to the improvement and enlargement of this Society's collection. The Library, although containing many valuable volumes, the generous donations of former patrons, yet stands greatly in need of being replenished with works of scientific value published within the last ten years. Gentlemen desirous of promoting the interests of science in this province and city, would therefore materially do so by contributing to the increase and efficiency of our collection of scientific books.

The inauguration passed off most pleasantly. The presence of that distinguished veteran, General Sir William Eyre, and his lady, added much to the interest of the proceedings. Mrs. Bell, with several amateurs under the guidance of Prof. Howe, enlivened the evening with beautiful music. We were glad to see again amongst

us our distinguished scientific guest, Mr. Hall of Albany. His speech will be read with much pleasure and interest. Our excellent President, Principal Dawson, conducted the business of the evening with his usual felicitous urbanity and address. We are happy to find that the removal of the Society to their new building has not only called forth the liberality of our friends to the amount of £400, but also added many new members to our roll.

The President (Principal Dawson) spoke as follows:—The occasion of our meeting here this evening is a memorable one in the history of this Society, and I trust also in the annals of Natural Science in Canada. We have long desired to possess a building suitable for the preservation and exhibition of the large and increasing collection which is to-day, for the first time, adequately exposed to public view. (Applause.) This end we have at last attained, and I desire here, in as few words as possible, to express our obligation to those by whose aid this Society has at length found a fitting local habitation. And first, I may say that the Society owes much to the zeal and activity of its officers; and without derogating from the merits of others, I should expressly mention the Recording Secretary, Mr. John Leeming, the Curator, Dr. Fenwick, and the Treasurer, Mr. Ferrier. We owe, also, an expression of gratitude to several gentlemen not officers of the Society, for aid in the arrangement of the objects in the museum, and more especially to Mr. D'Urban, and to one of our guests of this evening, Mr. Carpenter, who has kindly devoted two days to the proper classification of our collection of Mollusks. I must next refer to the liberal terms on which the University of McGill College has bestowed the ground on which this building stands—terms which exact only that which this Society is at all times most ready to offer, access to its collection, as a means of assisting the studies of our younger naturalists. I may add, on behalf of the University, that it rejoices to have it in its power thus to aid a Society engaged, like itself, in the promotion of liberal education and science. I have next to refer to the kind liberality of the citizens of Montreal, in contributing, by voluntary subscriptions and payment for life memberships, to our building fund, and to the transference to this Society, for the same purpose, of the the balance in the hands of the Committee for the American Association. For the rest, we have expended in the same manner the proceeds of the sale of our former building, including, of course, the amount of the bequest of the late Rev. Mr. Somerville. The building has cost about $10,000, and we shall probably have

remaining upon it a debt of about $2,000. It is very desirable that we should be freed from this burden, and our only hope for this is the continued bounty of our friends, which we trust still further to stimulate by the offer of life memberships, giving a substantial interest in the Society in exchange for contributions to its building fund. It might be supposed that after so large efforts on our part, we might successfully urge claims on the Legislature for a grant from the public funds; but we have learned from experience that Government regards the scientific tendencies of the citizens of Montreal as in no need of its fostering care. To other cities, smaller it is true, and less wealthy, liberal grants have been made for scientific purposes; but our independence has been fully acknowledged, in the past year, by the non-payment of even the pittance of £50 per annum formerly accorded. I would not have it understood that we wish to approach the Legislature as a pauper institution. With our present building, collection and membership, and with a self-supporting journal of our proceedings, supported by the enterprise of a Montreal publisher, we are in a position to say that we can faithfully apply for the benefit of Canadian science any means placed within our reach, and can even, as in the case of the grant for the meeting of the American Association in Montreal, treble such sums by our own contributions of means and effort; still, if we receive no such aid, we are content with the advantages derived from our position in this great centre of population. (Cheers.) Natural History teaches us that it is by no accident that the greatest and most prosperous city of British America is placed on the Island of Montreal. In its situation half-way between Cape Race and Ford du Lac; at the confluence of our two greatest rivers; opposite the great national highway of the Hudson and Champlain Valley; at the point where the St. Lawrence ceases to be navigable for ocean ships, and where that great river, for the last time in its course to the sea, affords a gigantic water power; at the meeting point of the two races that divide Canada, and in the centre of a fertile plain nearly as large as all England; in these we recognise a guarantee for the greatness of Montreal, not based on the frail tenure of human legislation, but on the unchanging decrees of the Eternal, as stamped on the world that he has made. (Applause.) We know, from the study of these indications, that were Canada to be again a wilderness, and were a second Cartier to explore it, he might wander over all the great regions of Canada and the

West, and, returning to our mountain ridge, call it again the Royal Mount, and say that to this point must the wealth and population of all this new world flow. It is not worthy of a city so placed to solicit mere artificial dignities; but it is worthy of it to promote within itself all those high moral and intellectual influences which should flow from it to the region around. (Cheers.) Although, therefore, this Society is not for Montreal alone but for Canada, and, as far as may be, for the world; yet, if it should rest for its support on this city alone, we know that, with the kind blessing of the Providence that has given us this goodly heritage, and with that support, cordially and liberally as it is always given to every deserving institution, we may hope to take a high place among the learned Societies of the western world. (Cheers.)

Sir William Eyre, said:—It was not without some considerable hesitation, that I accepted the proffered honour of addressing you on this occasion. I believe it is one of the essential requisites to addressing the public, to be well acquainted with the subject on which you are to speak, and in this respect I confess my deficiency. However, I feel emboldened and encouraged by the indulgence of a Montreal public, which has borne before the garrulity of an old soldier with admirable patience. (Applause.) And, although possessed of no scientific lore, I hope I have sufficient intelligence to appreciate attainments, to which I have myself no pretension, and sufficient feeling to respect and reverence the great *Savans*, who undoubtedly deserve the honour of being classed among the benefactors of mankind. What greater or nobler task can be assigned to genius, than that of diffusing truth and enlarging the sphere of our knowledge, and this not for the sake of mere amusement or the gratification of curiosity, or for the sake of being esteemed a little more knowing than others—objects not worthy of our ambition. But the leading advantage of the cultivation of science is this, that it is impossible or nearly so, to cultivate the faculties of the mind, and to enlarge the understanding without, at the same time, improving the heart, so as to make us better men, better husbands, better fathers, better neighbours, and better citizens, because we thereby get something interesting to think, and to talk about, instead of talking of and against each other. (Applause.) Those who have turned their attention to such subjects, know the pleasureable emotions which spring up within us, as we advance in true

knowledge. Those emotions are among the noblest of our nature, and in proportion as they are cultivated, the heart becomes softened and humanized. Those who once imbibe a relish for such pursuits, turn away almost instinctively from those grosser pleasures, which degrade mankind. There may be exceptions, but that is their general result and tendency. Some there are who think that human nature is only acted upon by considerations, which have self for their object. I think such philosophers are mistaken. They do not see the whole of the truth. They forget that man is made in the likeness and image of his Maker. Every man, however low and humble may be his position, is conscious of possessing something noble in his nature, which at times will respond to high and noble considerations. And if sometimes, why not always? Why should not such occasional visitations become the habit of the man? Nor is the pleasure of intellectual pursuits confined to the *literati* or to any particular class. There are a few in every class who can relish and appreciate such enjoyments. And if a few, why should not many? Even the benefit of a few is a sufficient inducement to generous minds to cause them to labour in the cause of humanity, but the aim of a large philanthropy will always be to convert the few into the many. (Applause.) I was much impressed with some things which came under my observation while travelling in Greece. Though always aware, that the modern Greeks resembled the ancient Greeks, their progenitors, in many respects, and that at all events, they were remarkable for their intelligence, I was not prepared to find what I did find on one or two occasions —the poor Greek peasants, but recently emancipated from the galling yoke of Turkish oppression, as they reposed under the shade of their olives, poring over the pages of Xenophon and Herodotus. (Applause.) Yet such was the case. They seemed perfectly aware of the *prestige* which had once hung, like their own mountain mist, over their beautiful land. They knew well the glorious height from which their race had fallen, but contemplating the glorious deeds of the past, and perhaps, dreaming of a glorious future, they seemed to forget the poverty and wretchedness of their present position. (Applause.) So too, in my own profession, many would be surprised if they went into the barrack-room, and saw the description of books that were to be found in the hands of not a few of the soldiers. Some are apt to fancy that the poor soldiers, the humble, but faithful servants

of the crown, have no relish for intellectual pursuits. The world gives them credit for courage and fortitude—and those qualities were well exemplified on the bleak and dreary *plateau* before Sebastopol, where the soldiers, though suffering every sort of misery, half clothed, half fed, over-worked, and almost emaciated, yet never flinched from their duty, but were always ready to meet the enemy. (Cheers.) All this the world gave them credit for, but it is not so generally known that many of them have minds cultivated to a degree far beyond what you would expect in their position. They have as keen a feeling and relish for what is great and noble as have any of our prosperous civilians. (Applause.) Returning then to the point from which I set out let me say that I think such institutions as this, which has for its object the searching out of truth and the diffusion of knowledge, are of real benefit to mankind, and that those who take a prominent lead in them deserve to stand high in the estimation of their fellow-men. It is a pleasing thing to those who take an interest in Canada to find that the people of Montreal, its principal city, give so warm a support to institutions of this kind. Montreal is already a great and flourishing city, and is every day growing in commercial importance. Its citizens are rapidly becoming wealthy and taking their place among the merchant-princes of the world. Its buildings are rising in all directions and casting their shadows over this splendid stream, which not only connects Canadians with the ends of the earth, but unites them among themselves, more effectually than any political union could do, and it can boast of that stupendous bridge, which, as an unrivalled work of art, is attracting the attention of the world. All this is subject of proud congratulation to the citizens o Montreal, but it is also right and fitting that they should shew to the world that, while not neglectful of material interests, they have minds which can appreciate subjects of a higher order, and that, while they know how to acquire wealth, they know also how worthily to spend it. (Loud cheers.)

Principal Dawson then introduced Professor Hall of Albany, whose reputation as a naturalist, he said, was not merely American, but world-wide. (Cheers.)

Professor Hall said:—I have been somewhat reluctant to accept the invitation to address this assembly, feeling quite unfit to do so, as I have been indisposed for several days, and I am afraid I am quite unprepared to say anything likely to interest

you. But, coming from the United States, where you believe or at least are wont to say we are in advance of you in natural science, it would be a great gratification to me, if, by appearing here on this occasion, I could give any encouragement to a society like this, having for its object the advancement of natural science—a study to which I have devoted 30 years of my life, with scarcely a thought of anything else. It is always very gratifying to me to meet an assembly of persons who are engaged in advancing, or who are doing anything to advance the cause of natural science. With us in the United States any organization of societies for the advancement of natural science reaches but a little way into the last century. A few years prior to the commencement of the present century, a few gentlemen, meeting in Philadelphia in the back office of a druggist's store, organized the Philadelphia Academy of natural science, which is now a most flourishing institution, possessing the largest natural history collection of any society in the United States. I believe about the same period the society which now bears the name of the Albany Institute was organized. At Albany we have three societies, having objects different but yet closely related the one to the other. We have one organized for the advancement of natural history, another for agriculture, another for arts and manufactures, and when we look to our records, we find that all kept equal pace in improvement. There the cast-iron ploughshare was invented, and improvements in that art on which we all depend for our subsistence went hand in hand with discoveries in natural science. The organization of our agricultural societies dates from almost the same period as the organization of our natural history societies, and the improvement of agricultural engines has kept pace with the progress of science. In other cities too of the United States, we have societies formed for the advancement of natural science in all its departments. Your society had a more recent origin, and you can give good account of the years of its existence by what it has already done. Your collections are already very important, and I am enabled to say so from a close personal examination, this not being the first occasion that I have seen them. You have already brought together very valuable materials to form the nucleus of that more extensive collection which would fully represent the natural history of entire Canada. And, as I have observed from the remarks of your president, you are fully alive to the advantages in this respect of

your geographical position, accessible alike from the sea-board, from the South, and from the West, so that with you the formation of a cabinet of natural science in all its departments would be a matter of comparative ease. All that is necessary is that the spirit which engages your interest in this society should be sufficiently pervasive to enlist the services of a sufficient number who shall devote themselves to the interests of science. That their names should be famous ought not to be their object. With the man who cultivates science, truth as manifested in nature should be the object of his devotion, himself entirely forgotten. Therefore, if you would advance science, forget yourself. However much or however little you may contribute to its treasures, never allow yourself to be prominent. Every intelligent person can do something in this way. If his time or means do not permit original investigation, he can contribute to collections. Every one can do that, and every little goes to build up the great mass. We should all contribute something towards building up the temple of science, so that those who come after us may acknowledge that those who went before them did not live in vain. (Applause.) There is one point which you can more readily appreciate than we in the United States, because you are more directly connected with our parent country. It is a new country which we inhabit, which we are filling with the fruits of civilization, and on whose soil we are fixing ourselves, establishing homes like those which we or our forefathers left on the other side. We have here too a new soil—not only a new country but a new soil, clothed with a vegetation entirely different from that we left across the Atlantic. Natural history embraces this soil and all its products, and not only the soil but the rocks from which it is derived, the plants and trees which it grows, and the animals which roam over its surface. Man at his beginning on the earth had nature made subservient to him, and we still are unable to subsist without those means which were more spontaneously supplied by nature to our early parents. Man depends for his subsistence on surrounding animals and plants, and he is unable to live separate or apart from them. Man is not a separate and individual creation, made to subsist separately. But the point I am coming to is this. We have brought from the other side of the Atlantic our domestic animals and fruits, on which our forefathers were fed and nourished. We bring them and plant them on this soil, and just in proportion as we know the character of

this soil, of its underlying rock formations, and of these rocks, in the same proportion do we advance in civilization, which is the great object of our life here, next to that of preparing ourselves for a better. But on this earth we cannot separate ourselves from the domestic animals around us. We have brought with us from across the Atlantic those to which we and our forefathers have been accustomed, and they too must subsist upon the food which is grown upon their native soil. And strange to say we see these imported plants driving out the natural weeds, which leave the soil and give place to the grass and seeds of Europe. The plants of Europe indeed often travel faster than the white man himself, The solitary traveller, making a trail across the great prairies of the West and over the Rocky Mountains, drops on his course the seeds of European plants, which, taking root and springing up. begin to supplant the native weeds, and thus prepare the way for the immigration of the white man. We are carrying on a process of rooting out which is necessary for our own existence. We are removing from the face of the earth, first the men who preceded us, next the animals, and then the vegetation, and introducing in their stead along with ourselves the domestic animals of Europe, and the vegetation on which they feed, and even at the same time the numberless insects which accompany that vegetation. In these circumstances it becomes a population like that of Canada or that of the United States to study more closely than those of Europe, the character of our soil and its products, and it may be necessary occasionally to present this view to shew that the cultivation of natural science is not merely a pleasant and delightful occupation, enlarging our sphere of knowledge, and improving our intellectual faculties, but that it is fitted to improve also our physical condition and to enhance our physical comforts. (Applause.) I am glad to be able to congratulate you on the advances you have made in natural science. It is one of the most pleasant duties of my life anywhere and everywhere in the United States to bear testimony to the advances which have been made in natural science in Canada. If you will allow me to digress for a few moments, I would call your attention to your own geology, to the particular *substratum* from which you derive your soil. You have wrought out here most admirably, by accumulating zeal, by intelligence, and by persevering labour, a knowledge of a set of *strata* which to this day are but little known in Europe. Your knowledge of your Laurentian rocks is far in advance of anything

known in Europe of rocks of the same age. These are not primary rocks. They have been called so. But here in Canada you have the merit of having first pointed out to the world that they are stratified rocks, that they have been laid down by water, that they shew beds of lime and sandstone laid down by water, but modified by subsequent changes. (Applause.) The knowledge of this, of the age of these rocks, of their stratified formation, and of their valuable minerals, is due to Canadian research. You have demonstrated, moreover, the stratification of another set of rocks, called here the Huronian, which had always formerly been thought to belong to the supposed primary chaotic mass. You have then your Laurentian and Huronian rocks, lying at the foundation of your geology, as monuments to your attainments in geological science. (Applause.) Then, with reference to the fossiliferous rocks, you have already done so much, that I cannot attempt to go over the ground. In the Trenton limestones, a Canadian has brought to light those beautiful stone lilies which grow in groups or forests beneath the sea. Your Anticosti too has furnished us with new light in geology. The gap between the Upper and Lower Silurian groups which we have been endeavouring in vain to fill up, you have extended to many hundreds of feet, teeming with the remains of ancient life. Again, it just now occurs to me that while we in the United States have been talking of fucoids, and trying to give names to fragments of plants that we found stranded among our *strata*, it is you who have set us right. One of your number, the President of this Society, found us drifting out to sea upon sea-weeds, and has brought us back, shewing that we had been dealing merely with rootlets of a plant which belongs to the Devonian period in all its course from its beginning to its end. This is another point in which in Canada you are far in advance of other geologists. (Applause). I do not wish to depreciate what has been done by my friends among ourselves on the other side, but these are certainly most encouraging steps which have been taken here in the progress of geological investigation—and those I have mentioned are not all. If I had time I could particularize many more. If, for example, I turn to the economical results of your Survey—for we must go to the soil or to the rocks for our economic materials everywhere and always—then I feel bound to say that you have done more than all our naturalists put together. (Applause.) We have not in any of our collections such a variety of economic

materials as you have here collected in Montreal. In the few years that Canada has been making progress, its progress has been great, and if any feeling akin to jealousy could spring up in my mind, it would be the fear lest Canada, in point of scientific attainments, should in a few years distance us on the other side. In my lessons in geography, as a school-boy, some quarter of a century ago, I remember that we read of Canada as being almost a wilderness, and that it was principally known for its exports of lumber and fur. (Laughter.) But, if 30 years ago, Canada was only known for her lumber and her furs, in 1851 and 1855, at the London and Paris exhibitions, Canada was known for something else, namely, the abundance of her economic resources, brought to light by the investigations of her geologists. If we look at the records of science during the last fifteen years, I think they will bear out the statement that no state or country on this or on the other side of the Atlantic has made more rapid progress in scientific investigations than Canada has done during that period. (Applause.) I have mentioned only a few of the things you have done, principally to encourage you to go on and do still more. I would urge upon one and all of you to go on building up this Natural History Society as a great centre, where you will not merely accumulate material shewing what Canada can produce, but where you will have a collection in which comparisons can be made in all the departments of natural history, and where the student can go to ascertain the names of the objects he is studying, and to see in what respects he can assist in still further enriching the collection. This is an encouraging prospect, and I would only say in closing—so labour that when your children and children's children come hereafter to look at the records of Canadian science, they may be able to say—"How much has been done by those who have gone before us; let us not be remiss in our duty, but let us go on extending, and still extending what has been done by our forefathers." (Loud applause.)

The meeting then adjourned half an hour for refreshments, and conversation.

The President having again taken the Chair,

Hon. Mr. CHAUVEAU rose and said he felt more than he could express, at being called upon on an occasion like this to address some observations to such an intellectual as well as such a brilliant assemblage. Every one who wished for the advancement of science must feel proud that the Natural History Society of

Montreal had at last succeeded in founding a building like this, which besides answering better than any previous building for the requirements of the Society, would also prove an ornament to the city. He could inform them, on behalf of the educational and literary bodies with which he was connected, that they viewed the erection of this building with the greatest pleasure, and were greatly gratified that at length the labours of the Montreal Natural History Society had met with such a reward as was witnessed in the opening and inauguration of this hall. He was one of those who believed that the material progress of a community depends principally upon its intellectual progress; and he thought this was the general opinion. When such was the fact the inauguration of this building ought to be regarded by the community as an event of no common occurrence. He had been glad to hear that the names of Canadian men of Science and their labours were so well known and appreciated in the United States, and he was certain that the audience would listen with renewed interest to the names of a few Canadian scientific men, names it would not be out of place to recall on an occasion like the present. (Applause.) Hon. Mr. Chauveau then read the following brief biographical sketches:—

Michel Sarrazin, Royal Physician and Correspondent of the Academy of Science, appears to me to have been the person who occupied himself most with Natural History in Canada. He was a native of Nuyts, in Bourgoyne. His skill as a surgeon was proverbial. In 1700 he wrote an anatomical description of the beaver, which was read in 1704 by Pitton Tournefort; also, in 1721, his anatomical description of the muskrat. It appears that so far he had had the modest sum of 600f., "without any reward from those whom he served," because he was "the only doctor in the whole country." The Dictionary of Natural Science, 6th vol., says that his work is the most complete in existence. He also employed his attention with other animals. The academy demanded from him information on the botany of the country, and I have reason to believe it was this that led him to discover Sarracenea Canadensis. He died at Quebec in 1734.

Gauthier, also a physician at Quebec, was known to have greatly occupied himself with Botany. Of him I have nothing better to tell than what Bibaud has already said.

The Marquis Galissonniere (Governor from 1747-49) appears also to have attended very much to Natural History; and Kalm

has told us that in hearing him he believed he listened to the great Linnæus.

Pierre Boucher, of Boucherville, who was Governor of Three Rivers, was equally remarkable for his integrity and magnanimity. He was in the country 30 years, when he was deputed to go to Louis the Fourteenth. He informs us that the great King was delighted by his frank answers. He had been ennobled, however, before that period. In 1663 he published a True Natural History of New France (Canada). Charlevoix said that that work was superficial, yet people like to read it, because it informs them of matters not now known.

Honourable Mr. CHAUVEAU, in conclusion, tendered his personal congratulations to the Society for the success which had attended their efforts, as particularly marked in the inauguration of the building. He resumed his seat loudly applauded.

The PRESIDENT said it was matter for congratulation that they had with them on this occasion some of the earlier members who had to do with the origination of the Natural History Society. He would now call upon Dr. Holmes, as one of those early members, to address the meeting. (Applause.)

Dr. HOLMES said that modesty was a quality which met with, general approbation, and after what they had heard this evening he thought Canada possessed a considerable stock of it. They had been living here for years past under the impression that they had been little known to the rest of the world, and that they had been doing very little to make themselves worthy of being known. But this evening they had the gratification and pride of hearing that they were in several points of view in advance of the whole world. (Cheers and laughter.) He accepted with great pleasure and gratification the statements which Professor Hall had made in regard to this point, and he was sure it had afforded them all great pleasure to hear that the labors of the scientific men of this country were appreciated at a distance in the manner they appeared to be. Dr. Holmes then proceeded to sketch the progress of the Natural History Society from its origin to the present day. It dated back, he said, to about the period when Professor Hall was being taught that Canada produced nothing but lumber and furs. At that time, though they did not make any very great noise externally, he was aware there were a number of men in Canada, who, though placed in unfavorable circumstances for their cultivation, nevertheless fully appreciated

the value of science and literature, and who, though they did not devote themselves to this pursuit, yet derived considerable gratification from them. One of the reminiscences of his youth related to a time when Griffintown contained but a single house, that of Mr. Robert Griffin. That gentleman used to assemble his friends—and he (Dr. H.) as a youth considered it a great privilege to be allowed to be present—to hear recitations of Shakspeare. Now, as recitations of Shakspeare even at this advanced period and in the metropolis of the world could draw large audiences, he thought Canadians were not then so very far back as Dr. Hall's books probably stated they were. (Laughter.) They had even societies at that time amongst them. He belonged to one which had existed before the Natural History Society, and which was styled the Literary and Philosophical Society of Montreal. This Society lasted for a year or two; the members got tired of it, the meetings were not attended, and it was broken up. Some slight collections made by it, however, formed a germ for the subsequent organization of the Natural History Society, which commenced its operations in the year 1827, on the 12th of May. To give it stability, it was determined that one of the leading objects should be the formation of a collection illustrating Natural Science. To one who, like him, had been engaged in originating the Society, it was exceedingly gratifying to witness such a museum as was displayed in this building to-night. (Applause.) The Society met at first in a small room, over a bookseller's shop in St. Paul Street, and remained there for several years until their collection became too large for their room. They then removed to a building—now thrown down—between the Banque du Peuple and the Montreal Bank. They remained there for several years, and then they purchased the building from which the Society had just now removed. At the meeting at which the Society was finally organized on the 16th May, 1827, there were 26 members present. Of these there were now only three living in Montreal—the Rev. Dr. Mathieson, Hon. Judge McCord, and himself. There was one other of these 26 original members who was now living in Upper Canada. Whether there might be others still living, who had left the city, he was not aware. Dr. Holmes proceeded to give an interesting sketch of the subsequent history of the Society, mentioning the names of several of its benefactors, and drawing a comparison between the liberality of the old Lower Canadian Legislature and the strange conduct of the present

Legislature in discontinuing the small grant to the Society. He claimed also for the Natural History Society that it had procured the Geological Survey, the benefits of which had been so strikingly set forth by Prof. Hall. He alluded to his long intercourse with Sir William Logan, as school-mates, as college-companions, and in after life, and passed a eulogy on the services rendered to science by that distinguished geologist, and then, after some further remarks, resumed his seat amidst warm applause.

The PRESIDENT said that, before the proceedings closed, he had one or two other remarks to offer. In reference to the Legislative grant, he had just received a note from the Corresponding Secretary, who said :—"The Legislature has not withdrawn its grant, but has neglected to send it." Perhaps there was a difference there by which the Society might hereafter profit. He had further to state that on Tuesday, the 1st of March, they would commence a course of lectures, to be continued weekly from that day, free to the public. The regular meetings of the Society for business purposes and scientific discussions were held monthly on the last Monday of every month. He hoped the number of members would now be increased, that the efficiency of the Society might be augmented. Already, however, they had in it no small amount of working scientific power. He need only mention such names as Logan and Billings in Geology; Smallwood and Hall in Meteorology; Holmes, Barnston and Kemp in Canadian Botany; D'Urban and Hingston in Zoology; Murphy and King in Microscopy; who were prepared to bring to their meetings every month something they had been doing, great or small, in the various departments of Natural History.

The proceedings then terminated shortly after eleven o'clock.

The Toronto Microscopical Society.

On the 1st of February, 1859, the lovers of Microscopical science in Toronto held a meeting for the purpose of forming a society. At a subsequent meeting the constitution was adopted, and office-bearers elected for the current year.

The following resolution was carried :—

Moved by Wm. Couper, seconded by John McRoberts,—"That a copy of the constitution now adopted, together with a list of the office-bearers of the Society, be forwarded to the *Canadian Naturalist* for publication."

President,—PATRICK FREELAND, Esq.
Vice-President,—THOMAS GARBUTT.
Recording Secretary,—JOSEPH DAVIDS.
Corresponding Secretary and Curator,—WILLIAM COUPER.
Treasurer,—JOHN MCROBERTS.

Constitution of the Toronto Microscopical Society.

ARTICLE I.

This Society shall be known as the Toronto Microscopical Society.

ARTICLE II.

Its objects shall be to promote microscopical research, and to collect and diffuse microscopical knowledge and information.

ARTICLE III.

SEC. 1. Any person desirous of forwarding the objects of the Society may be admitted a member thereof, by paying the sum of two dollars annually to its funds, and being elected a member according to Article IV. of the Constitution.

SEC. 2. Members shall be divided into four classes, viz: Ordinary Members, Life Members, Corresponding Members and Honorary Members.

SEC. 3. Ordinary Members shall be those who contribute the sum of two dollars annually to the funds of the society.

SEC. 4. Life Members shall consist of Ordinary Members, duly elected, who shall pay to the funds of the society the sum of thirty dollars, or who shall give to the society books, instruments, or microscopical specimens of the value of thirty dollars or upwards. Or of persons who may be elected Life Members by the society at any meeting thereof, for important services rendered to the society.

SEC. 5. Corresponding Members shall be persons residing out of the City of Toronto, engaged in microscopical pursuits, who may be desirous of forwarding the objects of the society, and who shall contribute the sum of one dollar annually to its funds.

SEC. 6. Honorary Members shall be persons eminent for their high standing and attainments in microscopical science, and the number of Honorary Members shall be limited to ten.

ARTICLE IV.

SEC. 1. Any person desirous of becoming an Ordinary or Corresponding Member of the Society, shall signify in writing to the Recording Secretary, such his desire, and deposit with him, at the same time, the amount of one year's subscription.

SEC. 2. He must be proposed as a candidate for admission at a general meeting of the Society, and ballotted for at the next ensuing general meeting, and the proposition of votes requisite for the election of any member shall be three-fourths of the ballot.

SEC, 3. Honorary Members must be recommended for election as such by at least three members, and such recommendation shall be submitted to the council for enquiry, and upon their approval of the recommendation, the person or persons proposed shall be nominated at one general meeting, and be balloted for at the next meeting in the same manner.

ARTICLE V.

SEC. 1. Any member whose annual subscriptions shall remain unpaid for the space of one month after the same shall become due, shall forfeit his claim to all privileges of the Society, and shall not be reinstated therein until he shall have paid all arrears.

SEC. 2. Members leaving the city, may, upon giving notice of their removal to the Recording Secretary, retain their connection with the Society, by paying the subscription of Corresponding Members.

SEC. 3. Members may be expelled from the Society upon the recommendation of the council, and by the vote of three-fourths of the members present at any general meeting.

ARTICLE VI.

The officers of the Society shall consist of a President, Vice-President, Treasurer, Recording-Secretary, Corresponding-Secretary, and Curator, who shall also act as Librarian.

ARTICLE VII.

SEC. 1. The ordinary affairs and business of the Society shall be arranged by the council thereof, which shall consist of the officers and four other Ordinary or Life Members, any three of whom shall form a quorum.

SEC. 2. The officers and other members of the council shall be elected by ballot at the annual meeting of the Society in January each year, from nominations made *vivâ voce* at such annual meeting; and they shall hold office until the general meeting next succeeding the appointment of their successors.

ARTICLE VIII.

SEC. 1. The general meetings of the Society shall be held on the first Tuesday in every month, except the month of January. Five members shall be necessary to constitute a quorum at any general or special meeting.

Sec. 2. At the meeting in January, which shall he held on the second Tuesday thereof, and shall also be called the Annual Meeting, the report of the council for the past year shall be presented, and officers and members of council for the ensuing year shall be elected.

Sec. 3. Special General Meetings of the Society may at any time be called by the Council, or Recording Secretary upon the written requisition of five members, of which meetings six days notice shall be given, and the special business to be considered at such special general meeting shall be specified in the notices calling the same, and no business other than what is so specified in the notices shall be taken up or discussed at such special meeting.

ARTICLE IX.

This constitution or any article thereof may be altered or amended at a general meeting of the Society. But it shall be necessary in every case that notice of the proposed alteration or amendment shall be given at the consecutive ordinary meetings prior to the meeting at which it shall be considered and voted upon.

Note on Mollusks and Radiates from Labrador.

Believing that one useful function of the "Naturalist" is the publication of local lists of species, we insert the following catalogue of specimens, collected on the coast of Labrador by Mr. C. C. Carpenter, a missionary sent to that region under the auspices of a Society in Montreal. They were obtained principally at Esquimaux Bay and other places in the vicinity of the Straits of Belleisle :—

Buccinum undatum—largest specimen 3¼ inches in length.

Trophon (*Fusus*) *Scalariforme*, a specimen an inch and three lines in length.

Rostellaria occidentalis—of rather large size.

Littorina rudis.

L. littorea (*palliata*).

Margarita helecina (*Arctica*).

Lottia (*Tectura*) *testudinalis*—some specimens more than an inch in diameter.

Saxicava rugosa—in *Nullipores*, which seem to be very large and abundant.

Mya arenaria—of very small size.

Solen ensis—large specimens.

Tellina Grœnlandica—abundant, and sometimes highly colored.

Mytilus edulis—Some of the specimens approach very nearly in their ovate forms and strong growth lines to those found in the tertiary clays.

Pecten Magellanicus.

Echinus granulatus—common, and of ordinary size.

Echinarachinus Atlanticus.

Uraster (*Asteracanthion*) *rubens*—one specimen eight inches in diameter.

Uraster ———, a species of which I have no description. The rays are 2½ times the breadth of the disk, less flattened, and with a narrower ambulacral groove than in *U. rubens*. The ambulacral spines are short and cylindrical; the upper part is nearly uniformly and very thickly covered with groups of club-shaped spines, nearly flat at their extremities. The madreporic plate is coarsely marked; the terminal plates of the rays are distinct and nearly annular. Is this the species described by Desor, in Proc. of Bost. Nat. Hist. Soc., as *Asteracanthion Forbesi*. All Mr. Carpenter's specimens have six rays.

Halichondria—Three species, all apparently identical with species found in other parts of the Gulf of St. Lawrence.

Mr. Carpenter's collection also contains *Platycarcinus irroratus* *Balanus crenatus*, and *B. balanoides* (*ovularis*).

REVIEW.

The Master-Builder's Plan; or, the Principles of Organic Architecture as indicated in the typical forms of Animals. By GEORGE OGILVIE, M.D., Aberdeen. London: Longman & Co. Montreal: B. Dawson & Son. Pp. 196.

The study of Zoology in these days requires something more than merely to become acquainted with the names, appearances habits and history of a certain number of animals with their economic uses, and the interesting anecdotes, fabulous or true, which have been related by travellers and lovers of the curious regarding them. It is a serious matter of research to compass the field which this wide and important department of science embraces. A terminology must be mastered as difficult as that which pertains to Chemistry, the most technical of sciences. Anatomy and physiology, with their curious structures and the difficult problems pertaining to their final causes must be encountered; and the department of Homology, which has risen in modern times to vital importance, must be investigated. Comparative anatomy has expanded itself into this latter phase, and aims at obtaining for itself a distinct and generic place in Zoology. Vast as this field may appear it is nevertheless included in the proper and systematic study of animal life. Difficult and profound as many of the questions which it starts may be they are yet perhaps the most interesting, if not fascinating, of any that can engage the human mind. They bring us into contact with mysterious life whose source and destinies lead us to the throne of the Eternal

God; they make us conversant with the multiplex organic forms through which life from its highest to its lowest phases performs its appointed functions in this world; and they invite us to survey the master-piece of the Divine Architect in man, his visible image and likeness.

Of late years, among several others of note, Prof. Owen of London has distinguished himself by his published writings in the department of Homology. In 1848 he published his great contribution to this branch of science, entitled, "On the Archetype and Homologies of the vertebrate skeleton." This was followed in 1839 by his work "On the Nature of Limbs." Lately he has published a concise summary of his views, in a cheap form, in one of the volumes of "Orr's Circle of the Sciences," which is described by a competent critic as a "little book both accurate and intelligible, and almost rendering any popular attempt in the same direction superfluous." The subject has also been philosophically and skilfully handled in McCosh and Dickie's "Typical Forms and Special Ends in Creation," which, to a thinking reader, is really a valuable work. Dr. Ogilvie's book is much smaller and less ambitious than that of McCosh's, and aims at being more popular; and, we may add, more Zoological in its treatment of the theme. The author's great object is, as he states in his introduction, "not to advance new truths, but rather to gain additional currency for such as have a fair claim to be already established, and in particular to convey an idea of the laws of organization to those who, without making natural history a special object of study, may wish to have a right comprehension of its general scope. His style is very perspicuous and vigorous. Every page of the book gives evidence of independent thought and personal investigation. In nine chapters he treats of the various plans on which Animals are formed; of the Vertebrate type and its modifications in Fishes, Reptiles, Birds and Mammals; of the Articulate type, with its relations to the Vertebrate, and its special modifications; of the Molluscan and Radiate types; and of the mutual relations of the leading types of organization. Chapters eight and nine treat of the co-extensiveness of type and design with organic matter, and their bearing on Natural Theology. In the Appendix there is a valuable list of recent and accessible works on the various branches of Zoology. The work is illustrated with many admirable wood-cuts; and altogether it is a most acceptable addition to the student's library of Natural History.