Technical and Bibliographic Notes / Notes techniques et bibliographiques

The Institute has attempted to obtain the best original copy available for filming. Features of this copy which may be bibliographically unique, which may alter any of the images in the reproduction, or which may significantly change the usual method of filming, are checked below.

L'Institut a microfilmé le meilleur exemplaire qu'il lui a été possible de se procurer. Les détails de cet exemplaire qui sont peut-être uniques du point de vue bibliographique, qui peuvent modifier une image reproduite, ou qui peuvent exiger une modification dans la méthode normale de filmage sont indiqués ci-dessous.

- ☐ Coloured covers/ Couverture de couleur
- ☐ Covers damaged/ Couverture endommagée
- ☐ Covers restored and/or laminated/ Couverture restaurée et/ou pelliculée
- ☐ Cover title missing/ Le titre de couverture manque
- ☐ Coloured maps/ Cartes géographiques en couleur
- ☐ Coloured ink (i.e. other than blue or black)/ Encre de couleur (i.e. autre que bleue ou noire)
- ☐ Coloured plates and/or illustrations/ Planches et/ou illustrations en couleur
- ☑ Bound with other material/ Relié avec d'autres documents
- ☑ Tight binding may cause shadows or distortion along interior margin/ La reliure serrée peut causer de l'ombre ou de la distorsion le long de la marge intérieure
- ☐ Blank leaves added during restoration may appear within the text. Whenever possible, these have been omitted from filming/ Il se peut que certaines pages blanches ajoutées lors d'une restauration apparaissent dans le texte, mais, lorsque cela était possible, ces pages n'ont pas été filmées.

- ☐ Coloured pages/ Pages de couleur
- ☐ Pages damaged/ Pages endommagées
- ☐ Pages restored and/or laminated/ Pages restaurées et/ou pelliculées
- ☑ Pages discoloured, stained or foxed/ Pages décolorées, tachetées ou piquées
- ☐ Pages detached/ Pages détachées
- ☑ Showthrough/ Transparence
- ☐ Quality of print varies/ Qualité inégale de l'impression
- ☑ Continuous pagination/ Pagination continue
- ☑ Includes index(es)/ Comprend un (des) index

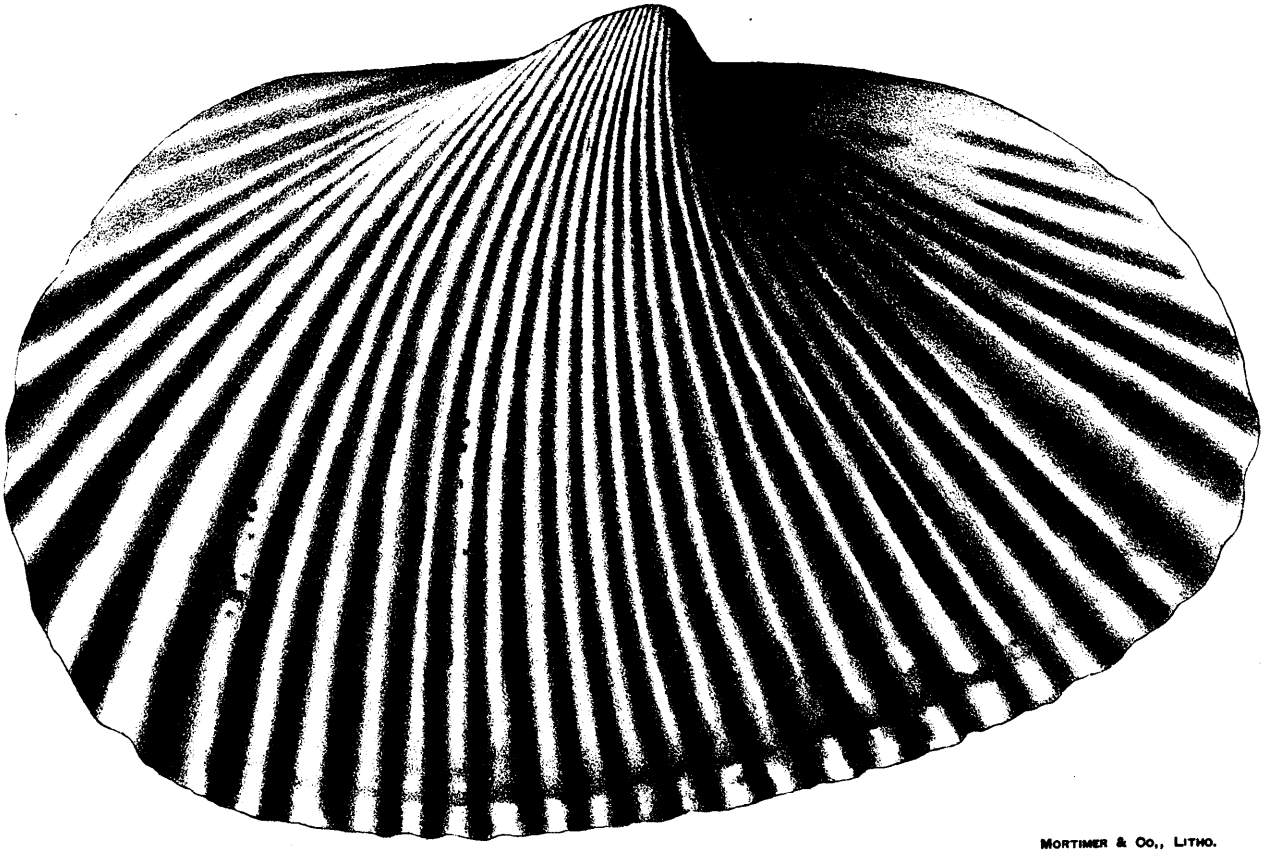
Title on header taken from:/ Le titre de l'en-tête provient:

- ☐ Title page of issue/ Page de titre de la livraison
- ☐ Caption of issue/ Titre de départ de la livraison
- ☐ Masthead/ Générique (périodiques) de la livraison

☐ Additional comments:/ Commentaires supplémentaires:

This item is filmed at the reduction ratio checked below/
Ce document est filmé au taux de réduction indiqué ci-dessous.

10X	12X	14X	16X	18X	20X	22X	24X	26X	28X	30X	32X
						✓					



L. M. LAMBE, F.G.S., DEL.

MORTIMER & CO., LITHO.

PANENKA GRANDIS (SP. NOV.) CORNIFEROUS; ONTARIO.

THE

CANADIAN RECORD

OF SCIENCE.

VOL. IV. OCTOBER, 1891. NO. 8.

Description of a New Species of Panenka from the Corniferous Limestone of Ontario.

By J. F. Whiteaves.[1]

In August last four specimens of the shell of a lamellibranchiate bivalve, of unusually large size, of a compressed, transversely elongated and subovate form, and with the surface marked with numerous coarse radiating ribs, were collected by Mr. L. M. Lambe, of the Geological Survey, in the Corniferous limestone at St. Mary's, Ontario. The specimens consist of two nearly perfect and tolerably well preserved single valves, one a right valve and the other a left, and two imperfect right valves, all of which evidently belong to a single and undescribed species of *Panenka*.

Although not mentioned in the latest manuals of palæontology, the genus *Panenka* was duly proposed and characterized by Barrande in 1881, in the sixth volume of his "Systême Silurien du centre de la Bohême," in which memoir no less than 231 species of this genus were described and figured. The word *Panenka* is there stated to be the equivalent of the Latin *puella*, in "la langue tcheque," *i. e.*, Czech or Bohemian. In Schmidt's Polish dictionary *Panienka* is given as the diminutive of *Panna*, a girl. The genus was regarded by Barrande as peculiar to

[1] Communicated by permission of the Director of the Geological Survey Department.

his Fauna No. 3, the representative of the Silurian (Upper Silurian), as distinguished from what is now called the Cambro-Silurian or Ordovician System. In 1885, however, in volume V, part 1 (Lamellibranchiata) of the "Palæontology of the State of New York," Professor James Hall described and figured fifteen sp ies of *Panenka* from the Devonian rocks of the United States. Some of these species had previously been referred to *Pterina* and *Monotis* by Conrad and S. A. Miller, and by Hall himself to *Cardiola.* The names of three additional species of *Panenka* from the Devonian of North America are given in S. A. Miller's "North American Geology and Palæontology," published in 1889.

This genus was, and still is, based exclusively upon the external characters of the shell, the hinge dentition, muscular impressions and pallial line of the interior of the valves being unknown. It is described as having no distinct cardinal area, like that of the *Arcadæ*, but some species are said to show obscure evidence of a ligamentary groove. The systematic position of *Panenka* is therefore quite uncertain. It is placed by Hall in the *Cardiidæ*, but Rudolf Hörnes has constituted a special family, which he calls the *Præcardiidæ*, for the reception of *Præcardium, Panenka* and several other similar and apparently closely related genera described by Barrande. This latter view of its relations, which seems to be the most satisfactory one in the present state of our knowledge, is adopted by Dr. Paul Fischer in his "Manuel de Conchyliologie." In that volume the family *Præcardiidæ* is placed between the *Grammysiidæ* and the *Pholadomyidæ*, but its author states that it seems to him to have closer relations with the *Anatinacea* than with any other suborder of the *Dibranchiata.* The species indicated by the four specimens collected by Mr. Lambe may be described as follows.

PANENKA GRANDIS. (Sp. nov.)

Plate I.

Shell very large, attaining to a length of from six to nine

inches, strongly compressed at the sides, though perhaps abnormally so, subovate in marginal outline, about one-third longer than high and highest posteriorly, the greatest height, exclusive of the beaks, being at or near the posterior termination of the cardinal border.

Anterior side produced and somewhat pointed, its outer margin sloping obliquely and rapidly downward from the cardinal border above, and forming a rather narrowly rounded junction with the ventral margin below: posterior side about equal to the anterior in length, but broader in the direction of its height and much more broadly rounded at the end: ventral margin moderately convex and most prominent posteriorly, nearly straight but ascending very gradually in the centre and anteriorly: superior border nearly straight or but slightly convex on each side of the beaks, curving gradually and somewhat convexly downward at each end, but rather more rapidly so at the posterior end than at the anterior: umbones oblique, prominent, central: beaks curved inward and a little forward.

Surface marked by from thirty-five to forty large, simple and rounded radiating ribs, which are nearly straight anteriorly, but slightly curved in the centre and posteriorly, also by numerous and unequal concentric lines of growth. In some specimens an occasional intermediate and very much smaller rib is developed between two of the larger ones. Characters of the interior of the valves unknown.

The figure on plate 1 is of the natural size. The specimen which it represents is the most perfect of the right valves collected, and measures 16.2 cm., or six inches and four-tenths, in length, and 10.7 cm., or four inches and two-tenths, in maximum height, inclusive of the beak. It does not happen to show any of the smaller intermediate ribs nor the concentric lines of growth mentioned in the description of the species, these being seen in other specimens. The shell attains to a much larger size than the specimen figured, for an imperfect right valve collected by Mr. Lambe was probably a little more than nine inches in

length, when entire, and not far from seven inches in its maximum height.

OTTAWA, October 9th, 1891.

NOTE ON THE OCCURRENCE OF PAUCISPIRAL OPERCULA OF GASTEROPODA IN THE GUELPH FORMATION OF ONTARIO

BY J. F. WHITEAVES.[1]

Opercula of gasteropoda appear to be of rather rare occurrence in the palæozoic rocks of Canada. The best known and earliest described are those of *Maclurea Logani*, from the Black River limestone of Paquette's Rapids, on the Ottawa River, which were first described and figured by Salter in 1851, in the first decade of "Canadian Organic Remains." The operculum of this shell, which has fortunately been found occupying its normal position in the aperture of the shell to which it belongs, is in many respects unlike that of any known gasteropod, whether fossil or recent, both in its internal and external characters. It was described by Dr. S. P. Woodward as "sinistrally subspiral, solid, with two internal projections for the attachment of muscles—one of them beneath the nucleus and very thick and rugose."

A specimen of another species of *Maclurea*, which has since been described and figured under the name *M. Manitobensis*, with its operculum in place, was collected by Prof. H. Y. Hind in the Trenton limestone at Punk Island, Lake Winnipeg, but this operculum is very imperfect and badly preserved.

In 1874-82 several solid, calcareous and multispiral opercula were collected by Mr. Joseph Townsend in the Guelph limestone at Durham, Ont., but none of these were found *in situ*. These opercula, some of which are described and illustrated in a report on the fossils of the Guelph forma-

[1] Communicated by permission of the Director of the Geological Survey.

tion of Ontario,[1] are circular in outline, their inner surface being flat, or nearly flat, and their outer surface convex. They vary considerably in the amount of their external convexity, some being nearly hemispherical and others conical externally, and probably belong to more genera than one. By analogy with similar specimens that have been found in place, in shells of the genera *Polytropis*, De Koninck (=*Oriostoma*, Munier Chalmas), and *Cyclonema*, Hall, in the Upper Silurian rocks of Gothland, these multispiral opercula from Durham are presumed to belong to species of those genera, the *Euomphalus macrolineatus* of Whitfield, and the *Straparollus crenulatus* of the present writer, both of which occur at Durham, being now known to be referable to *Polytropis*, and the genus *Cyclonema* to be represented at Durham by the *C. sulcatum* of Hall, though this latter shell also may be a true *Polytropis*. Both *Polytropis* and *Cyclonema* are referred by Lindström to the family *Turbinidæ*, partly because their shells "have retained the most evident traces of a nacreous layer," and partly on account of their solid calcareous opercula.

About five or six years ago, a few opercula of an entirely different character to any of those already mentioned were collected by Mr. Townsend in the Guelph formation at Durham. These, so far as the writer has been able to ascertain, are so unlike any opercula that have hitherto been described as occurring in palæozoic rocks, that it is thought desirable to place a short description of them upon record. They are rather thin, nearly flat, but slightly concave externally and as slightly convex internally, broadly subovate, about one-fifth longer than broad, obtusely pointed at the end corresponding to the posterior angle of the mouth of the shell whose aperture they closed, *paucispiral* and composed of from two and a-half to three rapidly expanding volutions, the nucleus being subcentral. Only the outer or concave surface of each of these opercula is exposed to view, the inner side being buried in the matrix. The accompany-

[1] "Geological and Natural History Survey of Canada. Palæozoic Fossils," vol. III, pt. 1, Montreal, 1884, p. 33, pl. iii, figs. 10, 10 *a-b* and 11, and pl. vii, fig. 7.

ing woodcut represents the exterior of the best specimen known to the writer, of natural size. Its maximum length is twenty millimetres and its greatest breadth sixteen.

Figure 1. Paucispiral operculum of a gasteropod, genus and species unknown, from the Guelph Formation of Ontario.

It is at present quite impossible to determine to which of the known gasteropoda from the Guelph formation in Ontario these opercula should be referred, if, indeed, they are referable to any. Judging by the shapes of the apertures of the shells into which they may have fitted, the most likely species, perhaps, are the *Holopea gracia* or *H. harmonia* of Billings, or a small and undescribed naticoid shell from Durham, which, so far as can be ascertained from a few casts of the interior, seems to be closely related to the *Holopea nux* of Lindström, from the Upper Silurian of Gothland. The resemblance of the operculum here figured to that of *Litorina* and *Natica* is very striking, and in this connection it is to be noted that Lindström places *Holopea* in the *Litorinidæ*. In the recent species of *Litorina* the operculum is invariably chitinous and extremely thin, while in *Natica* proper it is calcareous and not nearly so thin. The one here figured is so highly dolomitized that it is difficult to estimate its exact thickness, but it gives the writer the impression of being thicker than that of a recent *Litorina*. At the distance of a millimetre from the edge, its thickness, at the somewhat truncated termination of the outer volution, is between one-half and three-quarters of a millimetre, but it seems to increase rather rapidly in thickness inward.

The only other opercula known to the writer as occurring in the Palæozoic rocks of Canada are the depressed multi-

spiral ones of *Euomphalus Manitobensis*, one of which was obtained in place. These were collected by Mr. J. B. Tyrrell, of the Geological Survey, in 1889, from limestones of Devonian age at Dawson Bay, Lake Winnipegosis, and are described and illustrated in the eighth volume of "Transactions of the Royal Society of Canada."

OTTAWA, October 24th, 1891.

NOTES ON TREES ON THE GROUNDS OF McGILL UNIVERSITY.

By SIR WILLIAM DAWSON, F. R. S., &c.

In the year 1855, the grounds of McGill College were unfenced and practically a common, used for pasturage and open to all intruders. A few large trees existed on the banks of the little brook which then ran through the grounds, and to which, I suppose, the McGill Estate owed its name of Burnside; and along the brook there was a certain amount of coppice of thorn, young birch and alder, but so cropped by cattle and cut and broken by juvenile ramblers that it presented a very unsightly appearance. So soon as a fence could be erected, steps were taken to lay out the grounds and plant trees. I was induced to give attention to this by the wish to have the surroundings more in harmony with an academical building, and by the hope that attractive grounds might tend to induce efforts to improve and complete the buildings, might give more public interest in the institution, and might lead to a wish to retain the grounds for academical uses rather than to dispose of them for building purposes. To me and my wife the improvement of the grounds was a congenial task; and the late Mr. Baynes, then Secretary of the University, cordially seconded the effort, while the Board of Governors granted a little pecuniary aid. The old McGill house and garden at that time existed immediately below Sherbrooke Street, though rented to a market gardener. The garden contained many good shrubs and herbaceous plants, and was

laid under contribution in aid of our plans, and many native trees and shrubs were obtained by collecting on the mountain, or by purchase from country people and from Guilbault's nursery. At a later date Prof. Penhallow commenced a botanical garden on a portion of the grounds set apart for that purpose.

Aid was also received from friends. The late Hon. John Young had imported a large number of European trees for his own property at Cote St. Antoine, and liberally presented many healthy young plants to the College, and the late Mr. William Lunn, whose zeal in gardening is well known, presented rare shrubs and trees. Somewhat later, Mr. Charles Gibb, having commenced his experimental farm at Abbottsford, sent a number of rare species, and Major Campbell of St. Hilaire, presented spruces and other trees from his estate. Seeds were also collected, and a little nursery of young trees was commenced in a suitable place in the ravine near Sherbrooke Street. Though neither my means nor those of the College were sufficient to provide proper attendance and sufficient labour, and though much damage was necessarily done by the public use of the grounds, yet they were beginning to present a creditable appearance and contained a large number of valuable foreign as well as native trees, when the unavoidable sale of land on University Street, and later, the exigencies of more direct educational work, in connection with the generous bequest of Mr. Workman, and the princely benefactions of Mr. W. C. McDonald, terminated our attempt to have a College garden and arboretum.

It is proper to state that, before our improvements began (as early as 1853), the late Mr. Shepheard of Montreal, in conjunction with the late Mr. J. Symmers, had presented to the College a plan for the laying out of the grounds, along with one for converting Sherbrooke Street into a boulevard with four rows of trees; which plans are still preserved. The formation of a central avenue consequent on the passage of the main pipes of the reservoir through the grounds, had rendered this original plan impracticable;

but on application to Mr. Shepheard, he kindly consented to lay out the portion of the ground on the east side of the avenue, in a manner suitable to the changed conditions.

Early in our planting operations, the Graduates' Society, at that time recently organized by Mr. Brown Chamberlin and others, took an interest in the matter, and proposed to plant a "Graduates' Walk," extending from the great elm round by the bank of the brook to Sherbrooke Street. They prosecuted the work actively and in a few years had the walk stocked with trees, the latest of which was an elm planted in honour of the visit of H. R. H. the Prince of Wales in 1860. The Graduates' Walk is now for the most part merged in the approach to the new W. C. McDonald Physics Building, and most of its trees have disappeared except those at its extremities.

Notes have been kept since 1855, of the results of the planting and attempts to introduce foreign trees and shrubs, and it was hoped that these experiments and observations would have been continued by Prof. Penhallow, but since the park and its trees may now be considered as things of the past, and any experiments hereafter made will be carried on under new conditions in the ground leased from the Trafalgar Institute, or elsewhere, it may be well to record for the benefit of others the results of the observations made.

It may be premised here that the grounds are sheltered by the mountain, have a favourable exposure to the south-east, and have three varieties of soil—the sandy soil afforded by the Pleistocene Saxicava-sand toward the front, clay soil resting on Leda-clay and Boulder-clay and the alluvial soil in the little ravine, not to mention the rocky ground on Trenton limestone and old quarry pits, which was, for the most part, occupied by the Medical Faculty's building.

In noticing the trees and shrubs, I shall take them in no very definite order, but shall give a list with notes on each species, taking native trees and shrubs first.

1. The Red Oak. *Quercus rubra.*

Several fine specimens of this tree existed along the bank of the brook—four of which still remain intact (1891). The finest specimen was drawn and engraved for the restoration of the Indian town of Hochelnga in my book "Fossil Men," in consequence of Cartier's note, that on his visit to the village of Hochelaga, he saw great oaks with large acorns on the path leading from the landing place below the current to the village. Our oaks are not those of Cartier's time. One of the largest, cut down last year, showed 160 rings of growth, so that it may be regarded as a child of the oak forest of three centuries ago. Sandy soil, especially with clay underlying at some depth, seems to be specially suited to this tree, whose large shining leaves and spreading form make it one of our finest forest trees.

2. The White Oak. *Quercus alba.*

This species was not indigenous to the College grounds, but a few fine plants were purchased. They throve well in the more moist and rich ground, but were only young trees, and all have perished in the progress of improvements. There seems no reason why this species should not be cultivated as a timber tree in the Province of Quebec; but it requires a good soil and exposure.

3. The Overcup White Oak. *Quercus macrocarpa.*

This is not an indigenous species, but a few acorns from the North-west were presented to me some years ago by Dr. G. M. Dawson. One good plant was raised from these and was carefully tended. It grew well and promised to be a fine tree, but had to be removed last year, and I fear has perished. I have found that oaks do not readily transplant, as we have lost several good trees in this way. This species deserves to be introduced in Lower Canada as an ornamental tree. Its large leaves give it a fine appearance. It loves limestone soil.

4. The English Oak. *Quercus robur L.*

Specimens of this species were presented by Mr. Young, and were planted in different soils and exposures; but they proved incapable of enduring the winter and all perished; those in the lighter and more sandy ground surviving longest. In any case this tree is not comparable as an ornamental tree with our native species, and its leaves hanging withered on the branches in autumn give it an unsightly appearance.

5. The Beech. *Fagus ferruginea.*

A bed of young plants of this fine tree was raised from the nuts, and one specimen still remains. It grows well but not in the sandy soil, and as only very young trees have been on the grounds, little can be said respecting it. It is known, however, to love a rich calcareous soil, and, where this exists, to thrive even on rocky ground. Our beech is scarcely so fine a tree as the European beech, the hardiness of which, in Canada, I have had no opportunity of experimenting on.

6. The Hazel. *Corylus americana.*

A plant of this species obtained on the mountain about 1858, has grown luxuriantly and bore fruit every year. It was destroyed last year. The hazel is a long lived and beautiful shrub. As one usually sees it on poor ground and cropped by cattle it has a shabby appearance, but under more favourable circumstances it forms a fine element in shrubbery. Its catkins are pretty in the spring, and in autumn its fruit is curious and is edible.

7. The Hornbeam. *Carpinus americana.*

A fine and somewhat aged specimen of this little tree, native to the place, existed till last year in the lower part of the grounds. It is of slow growth and straggling form. One young tree still remains near the head of the avenue,

and is noteworthy for the brilliant crimson and yellow colours which its leaves assume in autumn; and as the leaves are somewhat persistent, their beauty remains till late in the season.

8. Birch. *Betula papyracea* and *B. populifolia.*

These white birches, so common throughout Eastern Canada, were native to the soil. One very old and spreading tree was probably the finest in Montreal. Its main trunk was short and the young people used to ascend and use the spreading branches as a study in the warm weather of summer. The white birches are trees of rapid growth and extremely hardy. I have specimens growing on somewhat poor soil, which, in twelve years, have attained the height of 30 feet and are beautiful trees.

9. European White Birch. *Betula alba.*

The cut-leaved variety of this tree has grown very successfully, and its pendulous branches and pure white bark produce a fine effect. Several other species or varieties of foreign birches were presented by Mr. Gibb, but had to be removed to the new botanical garden on the Trafalgar property. The bronze-leaved variety did well and had a fine appearance. The remaining specimens are of the green and cut-leaved variety. Being more graceful and pendulous than our native species, and apparently quite hardy, they deserve cultivation.

10. The Yellow Birch (*B. lutea*) was not originally on the grounds, but a good specimen was planted on the Graduates' walk and has thriven, though perhaps the soil is rather light for this species. I had hopes that it might have gone on to rival our oaks and elms, as when mature, it is a majestic tree, one of our finest native species, but unfortunately it is too near the line of the approach to the Physics building and probably is doomed to disappear.

11. The Arctic Birch. *Betula pumila.*

A plant of this species presented by Mr. Gibb was tended for several years on the terrace in front of the College, but did not thrive and eventually died. I planted it alongside of a Tamarisk in hopes of reconciling to the same conditions these two trees of so different habitat. But the birch drooped in the heat of summer and the branches of the tamarisk were winter-killed, so the experiment was not successful. The tamarisk survives as a small shrub, sending up shoots from the root. The dwarf birch is dead.

12. The Alder. *Alnus incana.*

This common shrub grew plentifully on the borders of the brook, forming a dense thicket on the flat ground near University street, under which were many shade-loving ferns and herbaceous woodland plants. It is now extinct. I may mention with it the English Alder—*A. glutinosa*—a much finer plant, attaining to the dimensions of a small tree on one stem. Specimens of this were given to me by Mr. Young and grew vigorously for a few years, but seemed liable to have the young wood nipped by frost in winter, and finally perished. The cut-leaved variety seems more successful; and one specimen, presented by Mr. Gibb, still remains.

13. The Basswood. *Tilia americana, L.*

This tree is common on the mountain, but did not exist on the grounds till planted. It is a rapidly growing and beautiful tree, forming a fine variety with maples and elms, and interesting in spring from its clusters of fragrant flowers on a leafy peduncle, while its large heart-shaped leaves afford a grateful shade. It does not appear to be a tree of long life, and when pruned or wounded is very apt to decay in the stem. A large specimen in the avenue, which will have to be removed for the approach to the engineering building, has suffered in this way, and though

by no means an old tree, is little more than a picturesque ruin. Another and younger specimen remains and may serve to represent the interesting botanical relationships of the Tiliaceæ.

14. The Elm. *Ulmus americana.*

One fine specimen stood on the ground in 1855, and was usually known as the "Founder's Tree," having been planted or preserved by Mr. McGill. It still stands, and is tall in form and less spreading than elms usually are near Montreal, and is now (1891) 10 feet in circumference at two feet from the ground. Many others have been planted, especially along the avenue, where it was intended to have a row of elms along each side. Great difficulties were found however, in planting them successfully in the drier parts of the ground, and in some places they would succeed only after digging up a wide and deep bed and filling it with manure. So soon, however, as the roots reached the moist clay of the subsoil the trees grew vigorously. It has happened in this way that some of the dying trees have been replaced by maples; so that our avenue of elms is not altogether complete. An inner row of soft maples was planted at the same time, partly to protect the elms and partly to form a shade in advance of the latter, the intention being ultimately to remove the maples and to leave merely the avenue of elms. The elm is the favorite ornamental tree in the province of Quebec, not only because of its beauty, but on account of its rapid growth. A tree planted in 1858 by Lady Dawson on the east side of the avenue has now a circumference of 6 feet near the ground, and is quite a stately tree. It has grown more rapidly than some of the others on account of the more suitable soil. The rough foliage of the elm is remarkably exempt from the attacks of caterpillars. Its worst enemy in my experience is the prickly black caterpillar of the mourning cloak butterfly — *Vanessa antiopa.*

15. The Red or Slippery Elm. *Ulmus fulva.*

In 1855 there was a moribund tree of this species at the foot of the terrace in front of the college. Its roots had been in great part buried under the excavators' rubbish used in forming the terrace, and it was gradually dying. I planted at its root the wild vine and the Ampelopsis or five-fingered ivy, which in a few years completely clothed its stem and dead branches, giving it a fine appearance, especially in autumn, when the bright yellow of the vine and the crimson of the Ampelopsis had a most brilliant effect. It was one of the chief ornaments of the front of the buildings for many years, when, decaying at the base, it was finally overthrown in an autumnal storm. Other trees of this speeies were planted, but their inferiority to the ordinary American elm, both in form and stature was too manifest to encourage their multiplication.

16. The Corky Elm. *Ulmus racemosa.*

This species is distinguished by the curious corky excrescences on its trunk and branches, and by its stiffer and more rigid branching as compared with the ordinary species. A fine young specimen from St. Andrews was presented some years ago by Dr. Harrington and was growing well, but it was one of the victims of the recent improvements.

17. The English Elm. *Ulmus campestris.*

Specimens of this tree were presented by Mr. Young, and having been planted on good soil grew vigorously; but the twigs were liable to be winter killed and the tree then sent off shoots from the root, giving it an unsightly appearance. It is much stiffer in habit of growth than our elm, with smaller foliage and a tendency to corky excrescences on the bark. It is evidently scarcely hardy enough for our climate, though it has succeeded well in New England. All those in the College grounds have perished, except one

young tree; but I still have a plant in my garden in Walbrae Place.

18. The Butternut. *Juglans cinerea.*

A row of these trees of large size formerly existed in continuation of the oaks along the bank of the brook to the rear of Mr. McGill's property of Burnside. They were probably along the line of an old fence or farm road. Five or six of these trees existed in 1855, and were regularly visited every autumn by troops of nutters from the east end of the town. The best of the survivors occupies a large space in my garden in Walbrae place, part of which was purchased from the rear angle of the McGill property. The ruins of another stand in front of the Medical Faculty's building and are at least picturesque. This tree was partly buried by excavated material, but has survived this, though many of its branches were killed. Another stands in front of the Thomas Workman Technical building and may probably be spared. Several young trees intended to renew the old ones have been destroyed except one near the chemical laboratory of the Medical School.

The butternut is a very beautiful tree and well deserving cultivation, though it has the fault of leafing late in the spring, and dropping its foliage early in autumn. It is easily raised from the nut if planted in autumn, and grows with rapidity. It is quite a common tree on the farms northward and westward of Montreal.

The butternut, owing to the food it affords and to the shelter provided in the older trees by decayed spots, is a favourite home of the red squirrel. A pair of these animals has continued to maintain itself in the great tree near the Workman building for thirty years, notwithstanding occasional stoning by boys, and one individual at least still holds its ground up to the present autumn.

19. Hickory. *Carya porcina.*

A few fine specimens of this beautiful and stately tree

occurred on the line of the Burnside brook. The best was destroyed in 1890. One remains on the lower part of the grounds, and another still survives between the Thomas Workman building and the Medical School. This is a more lofty but less spreading tree than the butternut; and in autumn its bright yellow foliage forms a beautiful variety. Though less rapid in growth than the butternut, it grows quickly in good soil and should be cultivated, both on account of its beauty and the utility of its remarkably strong and tough wood. In appearance it resembles the ash, but is a more beautiful tree.

20. The Maples. *Acer saccharinum, A rubrum, A dasycarpum.*

Curiously enough no maples existed on the grounds in 1855. Now they are the prevalent trees, and many of the best trees are from seed collected in 1856, and sowed in our little nursery on the flat near Sherbrooke street. All the three species above named are on the grounds. The first is the most stately and enduring, but of less rapid growth than the others. In autumn its foliage is variegated with red and orange. The red maple, a more rapid grower but less grand and enduring, has the most brilliant red leaves in autumn. Those of the white maple, *A. dasycarpum*, are yellow in autumn. The belt of red and white maples along the east side of the grounds, all from seed sown by ourselves, was one of the finest bits of woodland foliage about Montreal, but was destroyed to make room for the Thomas Workman building. The thinner belt on the west side of the campus is also a good feature, but much inferior to the other, owing to poorer soil and the injury done to the trees by boys and spectators on occasion of games and athletic sports.

21. The Mountain Maple. *Acer spicatum.*

This tree, better suited to the colder and more bleak portions of the country, has been naturalized on the college

grounds, where one plant still survives. It is of small stature, rather a large shrub than a tree, but its white bark, its peculiar light green foliage and its beautiful spikes of green and red samaras in autumn, entitle it to attention as an ornamental plant. It is easily cultivated and an excellent shrub for hiding palings or other unsightly objects.

22. The Norway Maple. *Acer platanoides.*

Several specimens of this tree were presented by the Hon. Mr. Young, and it proved the finest of all those given by him as an ornamental tree. Our only remaining example is that near the Peter Redpath museum. This tree somewhat resembles our sugar maple, to which it is nearly allied, but it has larger and deeper green foliage, is earlier in putting forth leaves in spring, and retains them longer in autumn. It seems perfectly hardy, and is in all respects one of the finest ornamental trees from abroad ever introduced into this country. A seed bed was established for the sake of propagating plants for distribution; but the plants had to be removed owing to building operations. A number of them, however, still exist in care of Prof. Penhallow.

No tree better deserves the attention of arboriculturists. It would probably yield sugar, but I am not aware that its properties in this respect have been tested.

23. The English Maple. *Acer campestre.*

This very beautiful small-leaved maple was introduced by Mr. Young, and a number of specimens were planted on the grounds. All those on the richer and less sheltered ground were so much winter-killed that in a few years they perished; but a few plants which happened to be put on the dry terrace, sheltered by the buildings, have held their ground, not however as trees, but as shrubs. Their beautiful and singular foliage always attracts attention. It is deep green in summer and pale yellow in autumn. They have never borne fruit, and every spring require pruning

of dead twigs. The variety which has succeeded best is that having the roughest and most corky bark. The plants now in front of my residence, though mere shrubs, are about thirty years of age.

24. The Sycamore Maple. *Acer pseudo-platanus.*

A fine healthy specimen of this tree was presented by the late Mr. Gibb and proved to be hardy and a vigorous grower, while its great glossy leaves were more showy than those of any of our other maples. It had attained to a height of more than thirty feet, and was a beautiful and shapely tree. Being a little removed from the new buildings I had hoped that it might be preserved; but on occasion of cutting down some common trees which were in the way, the workman extended his commission to this tree also, and I arrived on the ground too late to save it.

25. The Ash-leaved Maple. *Negundo aceroides.*

Our experience with this handsome tree is of interest, as showing the difference in hardiness of specimens from different localities, a point to which attention has recently been directed by Mr. Fletcher, of the Experimental Farm, Ottawa. Desiring to introduce the tree as a botanical specimen, in consequence of the peculiar form of its leaf, I purchased some plants from a nursery in the State of New York, but was much disappointed with the result. The ends of the twigs were winter-killed and the trees soon began to lose their beauty in consequence, so that I regarded the experiment as a failure. A little later some seeds from Manitoba were sent to me in a letter by Dr. G. M. Dawson and produced healthy plants, which showed no sign of winter-killing, and now I have healthy and vigorous trees perfectly suited to the climate. They have already borne abundance of seed which has been cultivated by Dr. Harrington, and numerous plants have been distributed by him. He has even found that this progeny of the North-west Negundo will grow successfully as far to the North-

east as Little Metis on the Lower St. Lawrence, where he has plants ten feet high. One of my original Negundos still exists in the College grounds, and I hope will be spared to become an old tree. Dr. Harrington has ascertained, from specimens on McGill College grounds, the proportion of sugar yielded by this tree, as compared with the sugar maple, which is so considerable as to warrant its culture as a producer of sugar.[1]

26. The White Ash. *Fraxinus americana.*

A great number of trees of this species were raised from the seed, and have been planted in various parts of the grounds. The belt of trees on the east side of the Medical building consists of this species, and presents a fine mass of foliage in summer, through the trees are still young. The ash suffers in some years from the attacks of the tent caterpillars (*Clisiocampa*), and is rather straggling and slender in its habit of growth, but it is easily cultivated and is a rapid grower, especially in moist ground.

27. The English Ash. *Fraxinus excelsior.*

A few specimens of this species were presented by Mr. Young. One still survives in front of the east wing, but is in danger of death from being embanked in earth. It grows vigorously and stands the climate well, but puts forth its leaves very late in spring, so that a casual observer, seeing it bare after other trees are in leaf, would suppose it dead. It is a finer and more stately tree than any of our species, and deserves cultivation.

28. The Mountain Ash *Pyrus Americana* and *P. aucuparia.*

The first named species is the native mountain ash and the second is the European species. Both are handsome small trees and produce beautiful pinnate leaves and rich clusters of scarlet berries in autumn. The American spe-

[1] Trans. Royal Society of Canada, vol. v, 1888, p. 39.

cies is the more luxuriant grower and has larger and more shining leaves. The English species is more delicate and graceful. Both are perfectly hardy, of rapid growth and easily propagated, and are not uncommon in gardens and shrubberies in and near Montreal. We had young trees of both species on the grounds as well as some varieties with peculiar leaves presented by Mr. Gibb, but they had to be removed to the botanical garden.

29. HAWTHORN. *Cratægus.* (Species.)

In 1855 the most abundant shrubs on the grounds were hawthorns, whose spines had enabled them to resist the attacks of cattle and boys. They also sheltered wild vines and other climbers. There were three species; the most abundant was *C. crusgalli*, the cockspur thorn, but *C. coccinea*, the crimson-fruited thorn was also present though rare, and one specimen of it still survives near the Medical building. The finest species, however, was *C. tomentosa*, the apple or pear thorn, which becomes when full grown a small tree, throwing out its branches horizontally with a very fine effect, and presenting an object of rare beauty when covered with blossom in spring. One of the finest specimens I ever saw was on the east side of the grounds toward University street. When it was proposed to sell lots on this street, Mr. D. Davidson,[1] then a member of the Board, declared that one of his chief objections to the sale of these lots was the probable destruction of this tree. It survived this ordeal, however, being a little beyond the limits of the building lots, but now its place knows it no more. A very fine, though younger, specimen still exists in front of the Library at the foot of the terrace.

Some years ago I suggested to the gatekeeper to plant a row of seedlings of this species along the Sherbrooke street front, in hope that they might replace as a hedge the old

[1] While these pages were in the press the news arrived of the death of this venerable and true friend of education, to whom both the University and the High School of Montreal are most deeply indebted.

paling along that front. The attempt was quite successful and the hedge still stands, though the paling has been replaced by an iron railing.

When in England in 1865, I procured some plants of the pink and crimson double hawthorn, so ornamental in that country in spring, and planted them in different parts of the grounds. One of them, planted in a rich and sheltered spot, grew well and flowered several times. The others were less successful, and eventually all succumbed to the rigour of the winter. The common variety of the English thorn is however more hardy.

30. JUNE-BERRY. WILD PEAR. *Amelanchier canadensis.*

This beautiful little tree was introduced to the grounds many years ago, and was the first to gladden our eyes in spring with its white blossoms, though the wild plum was sometimes about as early. I took special care of one specimen training it on a single stalk and cutting away the shoots which this tree is so prone to form at the base. The result was a specimen of unusually large size and beauty, which several botanists informed me was the finest they had seen. It was destroyed to make room for the engineering building.

On our grounds the delicious fruit of this tree, so much prized by the Indians of the North-West, could not be obtained, owing to the constant depredations of a grub which destroyed or rendered it unsightly, and the birds quickly disposed of the remainder. I had hoped by culture to improve the fruit, but could never obtain it in any quantity.

31. POPLARS. *Populus.* (Species.)

The Abele or European white poplar and the Lombardy poplar were early introduced on the grounds, and have grown vigorously. The former is too rapid in growth and too wide-spreading for limited grounds, and both are very exhausting to the soil in their vicinity. Of the native

species the only one to which I gave attention was the *P. grandidentata*, the large-toothed aspen, because of its resemblance to some fossil species, and the wonderful variety in form and texture of the leaves on shoots and branches of different ages, as illustrating the diversities of foliage in these fossil species. The tree is, however, of straggling and irregular habit of growth, and scarcely worthy of cultivation except for its tremulous leaves, in which property it is surpassed by its ally, *P. tremuloides*, but this also is a straggling and usually ungraceful tree.

32. Willows. *Salix.* (Species.)

Some plants of native willows existed originally in the grounds, and seemed to have been less attractive to browsing cattle than most other shrubs. The bright yellow catkins of the male plants formed an attractive feature in early spring. They appear, however, to be of short life and require to be frequently renewed. In recent years some foreign species of fine appearance were presented by Mr. Gibb. Two of these, more particularly, a gray or olive-leaved species and one with shining dark green leaves, were especially attractive and proved hardy and rapid growers. They are well deserving of attention where beautiful foliage is desired in a short time and where the soil is moist. The same remark may be made as to some of the finer varieties of the white-leaved poplar. The beautiful golden willow was early planted along the side of the brook, and though for some years it was impossible to protect the plants from the knives of schoolboys, they eventually overtopped their assailants and grew to the stature of trees, which formed a very pleasing variety in contrast with the maples and spruces.

33. Wild Cherry and Plum. *Prunus.* (Species.)

The choke cherry (*Prunus virginiana*), the black cherry (*Prunus serotina*), the common wild red cherry (*Prunus pennsylvanica*), and the wild plum (*Prunus americana*),

were all indigenous on the grounds, or early introduced, and flowered and fruited every year. A few specimens still remain. The wild red plum, still used for preserving, was an article of food with the old people of Hochelaga, as the stones are found in their kitchen-middens. It probably grew plentifully along the base of the mountain. The plants on the college grounds had apparently been sown by birds, and were principally interesting as harbingers of spring by their early blossoming—their fruit being usually destroyed by the curculio.

34. The Locust Trees. *Robinia pseudacacia* and *R. viscosa.*

Slips of these trees were obtained from friends at an early period of our planting, and throve well, especially the former, which, from its habit of sending up shoots from its roots, became almost a nuisance. The clammy acacia (*R. viscosa*) was more tender and liable to have the twigs winter killed, but it often bore abundantly its beautiful clusters of reddish flowers. A plant of the latter species still remains, but all those of the former had to give way to the new buildings.

35. The Catalpa. *C. bignonioides.*

For several specimens of this beautiful and interesting tree we are indebted to the late Charles Gibb, and all are fortunately planted in portions of the grounds not as yet invaded by building. They require a sheltered position, and some specimens seem perfectly hardy, while others, perhaps less favorably situated, have the shoots winter-killed. None of the specimens have yet flowered, and, as their growth is not rapid, it may be several years before we can have the pleasure of seeing the beautiful blossoms. I have observed that this tree has in Toronto been planted along some of the streets. Whether it would stand here in such situations is uncertain: but it deserves attention in ornamental grounds.

36. The Dogwood. *Cornus.* (Species.)

Of our different species of dogwood, that which seems most deserving of cultivation as an ornamental tree is *C. paniculata.* A fine tree-shaped specimen with very spreading branches is in the grounds, and is still vigorous though thirty years of age.

37. The Elders. *Sambucus canadensis* and *S. racemosa.*

Both species are cultivated in the College grounds. The latter is perhaps the most important. It grows very vigorously, is the first shrub to put forth its leaves and its not very showy blossoms in spring, and when in fruit is gay with its bunches of scarlet berries. It tends to have a straggling habit of growth, but is easily pruned and kept in shape. Its early vegetation in spring entitles it to special consideration in our climate; and though it prefers somewhat rich ground, it will grow well on dry banks.

38. The High Cranberry. *Viburnum opulus.*

Two specimens of this plant presented by the late C. Dunkin, Esq., still exist in the grounds, and their fruit, remaining over winter, produces a pretty appearance and provides a meal to winter birds. The double variety known as the snowball is a common ornamental shrub everywhere, but the brilliant berries of the single variety entitle it to consideration as an ornamental plant, though its flowers are much less showy.

39. The Sheep-Berry. *Viburnum lentago.*

This species, indigenous on the mountain, is the only other viburnum we have cultivated except the common snowball. It grows well and flowers and fruits freely, and is among other shrubs a pretty variety. In some parts of the country its berries are used as fruit, but are of little value.

40. The Woodbine or Five-Fingered Ivy. *Ampelopsis quinquefolia.*

This species grew freely among the thorn bushes and was used as a climbing plant as it generally is in Canada, with good effect. I owe to the kindness of my friend, the late Prof. Gray, some seedlings of the beautiful Japan species, *A. veichii.* This I have found too tender to grow in rich soil or in shady or exposed places, but in the dry soil and sunny exposures of the front of the college buildings it has held its own, though more or less killed back in winter, for about ten years. It is too tender for our climate, except in the most favourable soils and exposures.

41. The Staff-tree. *Celastrus scandens.*

This fine climber was abundant in the thorn thickets, and often bore quantities of its brilliant and permanent scarlet and orange fruit. It is now, however, confined to a single specimen trained over the front porch of the east wing, where it has continued unimpaired for the last twenty-five years, and puts forth is shoots and blossoms vigorously every spring, though it does not fruit. It is very well suited for this purpose, and I am surprised that it is not more frequently cultivated as an ornamental climber. When trained artificially, however, it often fails to fruit. It is not only a very beautiful climber, but has the merit of escaping the attacks of the minute insects so destructive to vines. I used to boast that it is altogether exempt from insect ravages; but only last spring I found some of the slender young shoots covered with the common black Aphis. It is an interesting example of the almost instinctive attraction of some climbing plants to supporting bodies. Its long red roots pass for a considerable distance underground, and whenever they come near to a post or tree stem, send up young plants though they may show no tendency to this elsewhere.

42. The Frost Grape. *Vitis cordifolia.*

This grew abundantly among the thorn bushes, often

weighing them down with its masses of foliage and fruit. As already stated, it was used for training on dead trees, etc., but latterly it was much affected, and its beauty destroyed by the attacks of a minute vine-fretter (*Tettigonia*). Its fruit is useless except for the plentiful colouring matter which it contains.

43. The Judas Tree. *Cercis canadensis.*

We owe specimens of this shrub to the late Mr. Gibb. It has, however, proved tender, even in a sheltered position, and has not flowered. It does not seem to be suited to our climate. Our largest specimen has been removed to the new botanical garden, where, perhaps, it may be more successful.

44. The Sumach. *Rhus typhina.*

This beautiful little tree is one of our best ornamental plants and will grow on poor stony soil. Its straggling habit of growth can be corrected by cutting down the tops of the young shoots annually for a few years. The female plant is much the best, being of more compact and vigorous growth and retaining its dense panicles of red fruit through the winter. In autumn the brilliant red leaves have a fine appearance. The fruit, though dry, is greedily eaten by some winter birds, and it is probably by the agency of these that the species is so plentifully disseminated over the lower part of the Mountain Park. Young plants trained separately on single stems and pruned as above directed, have a very fine appearance on exposed banks.

45. The Shrubby Hollyhock. *Hibiscus syriacus.*

I was much struck with the beauty of this plant as cultivated in the surburbs of Boston, and endeavoured to introduce it on the College grounds. The attempt was, however, unsuccessful. The tips were winter killed, and though I succeeded in having flowers for a few years, the plants ultimately perished.

46. The Angelica Tree or Shrubby Aralia. *Aralia spinosa.*

We owe this curious plant to Mr. Gibb. When growing vigourously and in good condition it is highly ornamental, but it is liable to have the terminal bud winter killed, and it has a bad habit of spreading freely from the root. It requires moist ground. Our best specimens have had to be removed, and some have been planted in the rear of the grounds near the Medical building.

47. Paulownia. *Paulownia imperialis.*

This tree produces magnificent leaves and is very ornamental, but unfortunately its large shoots are annually killed down. It has been on the ground for about twelve years and sends up vigorous shoots annually. It is deserving of cultivation even as a herbaceous plant, because of the beautiful foliage. Our best specimen has been destroyed but a smaller one still survives.

48. Shrubby Hydrangea. *Hydrangea arborescens.*

This beautiful, shrub presented by Mr. Gibb, has proved quite hardy and flowers profusely. Its large cymes of flowers are very showy in autumn, and if taken into the house can be dried and will remain fresh over winter. It has now been introduced into many private gardens. The best specimens I have seen are in the grounds of Mr. J. H. R. Molson.

49. The Horse Chestnut. *Æsculus hippocastanum.*

Specimens of this tree, presented by Mr. Young, have been growing for many years on the grounds and flower freely. I had hoped also to introduce the red variety, so much cultivated in England; but the specimens imported proved too tender to endure the winter, though Mr. Lunn, perhaps from some difference in soil or exposure, was more successful, and had vigorous specimens for many years.

50. The Spruces. *Abies.* (Species.)

We had originally no spruces on the grounds. The late Major Campbell of St. Hilaire was kind enough to send a car-load of young spruces to the College many years ago, principally of the black spruce, *A. nigra.* They were planted and grew well; but those in the vicinity of the cricket ground were all killed by the rough treatment they received. A group around the lawn tennis shelter still remains; but the best were planted on the east side of the grounds and have been destroyed. Mr. Gibb, at a later date, presented young plants of the Norway spruce, one of which remains. This species is finer in habit of growth than those of our country and perfectly hardy.

51. The Arbor Vitæ. *Thuya occidentalis.*

A few of these trees were planted in a clump in the central part of the ground in 1856 and still remain. I trust they will not require to be removed, as I am very desirous to obtain a record of the rate of growth of this tree, which seems to be extremely slow, a fact perhaps connected with the very durable character of the wood. Our specimens are only a few inches in diameter, while the elms and maples planted at the same time are a foot or more, and the spruces planted long after are twice their size.

52. The Larch. *Larix americana.* L.

Only a few specimens of the American larch were planted on the grounds, and I believe all have been destroyed. A fine specimen of the European larch still exists, but is too near to an intended roadway to be permitted to survive. The European larch is a finer and more compact tree than ours, and with more pendulous branches and larger and brighter coloured cones. It is perfectly hardy. The native larch has in many places been destroyed by the ravages of a caterpillar. I have not yet observed this to attack the English species.

53. The Juniper. *Juniperus communis.*

I brought a specimen of this plant from Cape Elizabeth about 1865, and planted it in what seemed a favourable spot. It grew and has continued to live up to last year; but its growth is so slow that in twenty-five years it was a low bush, with a total diameter of only about three feet. I feared to attempt to transplant it, and had hoped to preserve it by placing guards around it, but in my temporary absence it was buried under a pile of stones and destroyed.

54. The Ginkgo Tree. *Ginkgo biloba.*

I was naturally desirous to have this tree on the grounds, as an example of a taxine tree with broad leaves, as the sole representative of its genus, and as a modern example of a type which in Cretaceous and Tertiary times was represented by several species in Canada. A specimen which I obtained many years ago from a nursery in the United States still stands, but it is too large to be transplanted with safety, and I fear is so near to a contemplated road embankment that it may be destroyed. A few smaller examples, presented by Mr. Gibb, have been transplanted to the new botanical garden.

Miscellaneous Shrubs.

It would be tedious to refer to a variety of other ornamental shrubs cultivated or experimented on. Among those successfully introduced are the golden currant, the flowering raspberry, the Western white flowering raspberry from Lake Superior (*Rubus nutkanus*), the silver-leaf (*Elæagnus argentea*),[1] the lilacs, of which we had at one time five or six varieties, the species of Philadelphus or "Syringa," the burning bush (*Euonymus*), the fringe-tree (*Chionanthus*), various species of *Spiræa*, etc. Many of these, as well as Canadian herbaceous plants, have been transferred to the new botanical garden.

[1] This species, usually considered a Western plant, is also found locally in Eastern Canada, as, for instance, on the banks of Metis River, and it grows very vigorously and would easily run wild at Montreal.

I have always regarded the sight of trees and other beautiful or impressive natural objects as an educating influence of no small value, and all the more needed in a country whose tradition is the destruction, not the culture of trees, and where, even from a utilitarian point of view, arboriculture should be encouraged far more than it has been; while the love of rural beauty, for its own sake, at present so lamentably deficient among us, would be an influence not only elevating but tending to the best kind of patriotism. For this reason I had hoped to leave behind me, in connection with McGill, a college park, which, if not large, should be attractive and instructive from its variety and the number of interesting trees contained in it, where our young men could learn to know and love the useful and ornamental trees of our country, and whence some of them might go forth to take up the pursuits so admirably carried out by our late lamented graduate and friend, Charles Gibb. This portion of our educational work has for the present been suspended, except in so far as it can be renewed on the Trafalgar property; but I hope that the slender and imperfect record of it above given may aid those who may have opportunity to continue it under better auspices, and may possibly tend to induce some large-minded benefactor to bestow on the University a sufficient tract of land for a botanical garden and arboretum, like those connected with some of the greater universities on this continent and abroad.

For the present we have secured, as a refuge for a portion of our collections, the use of a desirable property on the mountain, belonging to the Trafalgar Institute; but this is only temporary, and it is evident that to make adequate experiments on tree culture, and to perpetuate the evidence of our results, requires a permanent property, and this of some magnitude and with somewhat varied soils and exposures. Our botanical department, as now organized under Prof. Penhallow, would render this beneficial not only to students, but to the country at large.

Notes on the Flora of Cacouna, P. Q.[1]

August 9th—18th, 1891.

By D. P. Penhallow.

In the flora of Cacouna and the adjacent districts of the Lower St. Lawrence, the botanist finds many features of interest, both in its extent and special character. One of the most prominent facts which first commands attention, is the brilliancy of the flowers, and the great profusion of many species which are nearly or quite at their northern limits of distribution. The presence of distinctly boreal species like *Arctostaphylos uva-ursi*, *Vaccinium vitis-idæa*, *Empetrum nigrum* and *Pinus banksiana*, and the predominance of such plants as alder, birches, *Linnæa borealis*, *Chiogenes serpyllifolia* and *Ledum latifolium*, together with a profusion of lichens and mosses, indicates a distinct approach to sub-arctic and arctic flora.

On the other hand, southern types are also met with, but many of them obviously near or at the extreme northern limits of their distribution. Such a combination of types lends a peculiar interest to the flora, which is also strengthened by the special physical characteristics of the region.

The geological formation of Cacouna and vicinity, is Lower Silurian. The various strata of sandstone, granitoid rock and shale are tilted up at an abrupt angle, and form a series of parallel ridges of variable height running north-east and south-west parallel with the general course of the river. These ridges rise to a height of 150–300 feet, and in one or two cases form isolated hills rising abruptly from the surrounding plain. Between them are large areas of alluvium which embrace both swamps and arable lands of fine quality.

The ridge following the shore line, and on which rests the Village of Cacouna, presents a very bold face towards

[1] Contribution from the Botanical Club of Canada.

the river, the cliff rising abruptly to a height of 50–100 feet, while somewhat farther back, the crest attains an altitude of 75–100 feet more. Towards the north, in the direction of Green River, the ridge gradually runs down to near the river level, while towards the south it also terminates at low level in a rocky point. For want of more exact identification, I shall refer to this locality as Cacouna Point. To the east of Cacouna ridge and rather nearer the Fraserville slope, but rising abruptly from the plain, is an isolated hill having a height of about 200 feet, and a northern and southern extension of about a mile. The western face is very bold and broken, while the eastern face slopes away somewhat gradually. This is known as Pilot Hill. Between the Cacouna ridge and the higher ridge at Fraserville, there is a ridge which rises abruptly from the surrounding plain, having its northern terminus near the Fraserville road, while its southern extremity projects well into the river at the landing. Between this point and the main shore at Fraserville is a deep bay, the shores of which are somewhat marshy. Again, between it and Cacouna Point, there is also a deep bay, the shores of which are very marshy almost up to the highway. This was found to be a locality rich in plants not found elsewhere. On the Fraserville side of this marsh, just under the bluff, are the ruins of a large stone house which will be referred to as the Old Stone House. Following the shore road past this point towards the landing, one is led through a succession of fields and finally through a beautiful wood, where is to be found an abundance of *Taxus* and more ferns than occur any where else in the vicinity. At the foot of all the shore bluffs are dense thickets, rich in species which do not find as congenial homes in other localities.

Cacouna Island is such only in name. It is in reality connected with the main land by a low neck which, at high water, is a few hundred feet wide, but at low water, expands to a broad tract of marshy land probably three-quarters of a mile or more wide. The island itself, is a mass of rock covered partly with thin soil, with bold shore

cliffs rising to a height of 150 feet. The summit of the island is probably 300–350 feet high.

Such a configuration of the surface presents conditions which are in a high degree favorable to a diversified flora, while the latitude—47° N.—favors the presence of distinctly sub-arctic and arctic plants.

The river, which is here about twelve miles wide, offers a great barrier to the northern extension of southern forms. The temperature along the south-east shore, is manifestly higher than along the north-west shore, a fact which is indicated by the presence of persistent fogs in the vicinity of the latter, when the former is wholly free from them. It is, therefore, highly probable that on the northern shore the vegetation is more distinctly arctic, and that many species which occur on the south shore, may be wholly wanting there. Comparative studies in this direction would be of value.

The prevailing arborescent vegetation consists of the white (*Picea alba*) and black (*Picea nigra*) spruces, with occasional specimens of pitch (*Pinus resinosa*) and white (*Pinus strobus*) pines, larch (*Larix americana*) and white cedar (*Thuya occidentalis*). The sugar maple (*Acer saccharinum*) is common as a shade tree, and occasionally is sufficiently abundant to form sugar bush. *Populus tremuloides* is common everywhere, while the Lombardy poplar (*Populus dilatata*) is very common in all the villages as a shade tree. The Banksian pine (*Pinus banksiana*) is abundant on Cacouna Island, as also, is the Canadian yew (*Taxus canadensis*).

The very great variety of situations in which plants of the same species occur, is a matter of constant surprise. The bunch berry (*Cornus canadensis*) which, further south is almost wholly confined to low lands, is here found extending from low, moist woods and meadows up the slopes of the hills and even on the dry, rocky slopes of the higher ridges. *Linnæa borealis* is also found both in low, mossy ground with *Ledum latifolium*, and in moist woods, and also on dry, rocky ridges among the shrubby growth. *Crypripe-*

dium acaule was found most abundantly on the tops of dry ridges where it was protected by shrubby growth hardly more than eight feet high.

The blueberry (*Vaccinium pennsylvanium*) is very abundant throughout the eastern region. The mountain ash is also common, and is largely used for ornamental purposes. It grows as a low tree or large shrub hardly exceeding 20 feet in height, and on Cacouna Island it is wholly dwarf.

The time of year at which our observations were made was not favorable to the collection of a large number of species, nevertheless, the fact that within eight days, no less than 220 species were observed, exclusive of grasses, lichens, and mosses, shows that the flora of the district is a fairly rich one. The following enumeration of species with their localities, will obviate the necessity of further comment. It shows 49 families, 149 genera, and 212 species. The species which have been introduced and are now naturalised, are indicated by *

THALICTRUM POLYGAMUM, Michx. (Tall Meadow-Rue.)

Very common in thickets on Cacouna Island, in the same localities on the mainland and in moist lands generally. Flower.

RANUNCULUS CYMBALARIA, Pursh. (Seaside Crowfoot.)

This plant was found somewhat abundantly on the shore at Cacouna Island and in the same situations on the mainland. It was chiefly found growing in the soil between rocks. It was observed in the greatest abundance at Cacouna Point. No flower.

RANUNCULUS SCELERATUS, L. (Cursed Crowfoot.)

Common everywhere in ditches, especially towards Fraserville landing near the old stone house. Flower.

RANUNCULUS PENNSYLVANICUS, L. f. (Bristley Crowfoot.)

Found somewhat sparingly in the low ground of the intervale east of Cacouna, and more rarely in grain fields. Flower.

*Ranunculus acris, L. (Buttercups.)

Very common everywhere. Flower.

Caltha palustris, L. (Marsh Marigold.)

Only a few specimens of this plant were found in the wet land between Cacouna Point and the point at Fraserville landing. The leaves alone were found.

Coptis trifolia, Salisb. (Goldthread.)

This species occurs in abundance on mossy hummocks in the low lands bordering the road to Cacouna station. No flower.

Actæa spicata, L., var. rubra, Ait. (Red Baneberry.)

Very common everywhere in moist thickets and woodlands, being particularly abundant along the shore at the base of the bluff. On Cacouna Island it was found extending nearly to the summit. Fruit.

Actæa alba, Bigel. (White Baneberry.)

Very abundant and found in the same situations as the last, the sharply contrasting red and white berries of the two species forming a striking feature in the undergrowth. Fruit.

*Brassica sinapistrum, Boiss. (Charlock.)

This pest is here found in considerable abundance in all the grain-fields. Flower.

*Brassica nigra, Koch. (Black Mustard.)

Commonly found about dwellings and in waste places. Like the preceding, it has become well established. Flower.

*Capsella bursa-pastoris, Mœnch. (Shepherd's Purse.)

This introduced species is everywhere common on the mainland, and constitutes one of the most common roadside weeds. It seems, however, not to have extended to Cacouna Island. Flower and fruit.

Viola blanda, Willd. (Sweet White Violet.)

From the abundance of leaves found, this is evidently

one of the most conspicuous of the spring flowers. It occurs everywhere in the lowlands.

VIOLA CANADENSIS, L. (Canada Violet.)

Only one specimen of this plant was found, and that on Cacouna Island, but although difficult to find at this season of the year, it is most probably one of the more conspicuous of the spring flowers throughout the open woods.

*SILENE CUCUBALUS, Wibel. (Bladder Campion.)

Very abundant along the roadsides and in fields, where it appears to constitute a troublesome weed. The usual height, as observed here, is from one to two feet. Flower.

ARENARIA LATERIFLORA, L. (Sandwort.)

A few plants of this species were observed near the shore of Cacouna Island, where it appears not to have fully established itself. On the mainland it is common all along the shore. Flower.

ARENARIA PEPLOIDES, L. (Sandwort.)

Very common on the sandy shore of Cacouna Point. Flower.

*STELLARIA GRAMINEA, L. Starwort.)

An introduced species of limited range here, being found only in cultivated fields at Cacouna Point. Flower.

SAGINA NODOSA, Fenzl. (Pearlwort.)

Very common in the sandy soil of the shore at Cacouna Point. No evidence of this species on the Island. Flower.

BUDA BOREALIS, Watson. (Sand-Spurrey.)

This plant grows in the same situations and has the same distribution as the preceding, the two being commonly mingled. Flower.

SPERGULA ARVENSIS, L. (Spurrey.)

A very common weed in grain-fields. Flower.

HYPERICUM MUTILUM, L. (St. John's-wort.)

A rather common plant in low ground. Chiefly in fruit, occasionally in flower.

ELODES CAMPANULATA, Pursh. (Marsh St. John's-wort.)

Common in the moss hummocks of low, boggy ground, chiefly in the intervale back of Cacouna. Fruit.

*LINUM USITATISSIMUM, L. (Flax.)

This introduced plant appears to be wholly confined to grain-fields, where it is quite prominent. It was not observed on Cacouna Island. Flower and fruit.

OXALIS CORNICULATA, L., var. STRICTA, Sav. (Wood-Sorrel.)

A few plants of this species were observed on the slope of Pilot Hill, and though a more extended search might disclose a larger quantity, it is apparently not an abundant species here. Flower.

IMPATIENS FULVA, Nutt. (Jewel-Weed.)

Very common in low lands, especially in ditches and along narrow streams, as well as in moist thickets of the mainland and Island. Flower.

ACER PENNSYLVANICUM, L. (Striped Maple.)

This shrub was noted as occurring but sparingly, and the impression was gained that it is here near its highest northern limit. A few shrubs are to be found at the foot of the bluff along the shore, and a few more at the foot of the bold western foot of Pilot Hill. Fruit.

ACER SPICATUM, Lam. (Mountain Maple.)

A very common species in all the thickets along the shore, particularly along the foot of the bluff towards Fraserville landing. Fruit.

ACER SACCHARINUM, Wang. (Sugar Maple.)

A common tree, extensively used for shade. These three species of maple were not observed on Cacouna Island.

*TRIFOLIUM REPENS, L. (White Clover.)

Everywhere common in cultivated fields and by the roadside. Flower.

*Melilotus alba, Lam. (White Melilot.)

Somewhat common as a roadside weed and in gardens, where it is still cultivated for ornament. Flower.

Vicia cracca, L. (Vetch.)

Everywhere common along the roadside and in thickets. It is extremely abundant in grass lands, where it covers large areas, and has all the appearance of being cultivated. The rich, deep purple flowers are most striking. It is also found all along the shore and is common on Cacouna Island. Flower.

Lathyrus maritimus, Bigelow. (Beach Pea.)

A most abundant plant everywhere along the sandy shores and gravelly beaches. On Cacouna Island it extends up the rocky slopes near the shore to a height of forty or fifty feet. The flowers are very showy and form a conspicuous feature of the vegetation. Flower.

Prunus serotina, Ehrh. (Black Cherry.)

So far as observed this species occurs here only as a small tree, and was found chiefly in the thickets along shore at the foot of the bluff, where it is rather common. Fruit.

Spiræa salicifolia, L. (Meadow-sweet.)

Found somewhat sparingly in dry, rocky fields near Cacouna Point. Flower.

Rubus chamæmorus, L. (Cloud-berry.)

In a sphagnous swamp on the road toward Green Island, about two and one-half miles from Cacouna church, this plant was found in considerable abundance. It was not observed elsewhere. Leaves only.

Rubus triflorus, Richardson. (Dwarf Raspberry.)

Common in the rather dry fields, on sandy soil, at Cacouna Point. Fruit.

Rubus strigosus, Michx. (Wild Raspberry.)

Extremely abundant on Cacouna Island, also on Pilot Hill,

and less conspicuously on the dry, rocky ridges. It is also very abundant in the woodlands of the intervales. The fruit of this plant, which is here gathered in great abundance, is in this locality remarkable for its size and flavor. Fruit.

GEUM RIVALE, L. (Purple Avens.)

Sparingly found in the marsh near Cacouna Point. Fruit.

FRAGARIA VIRGINIANA, Mill. (Strawberry.)

Very common everywhere in the fields, where it often covers extensive areas. Flowers and fruit.

FRAGARIA VESCA, L. (Strawberry.)

Rather common on the rocky ridges. Fruit.

POTENTILLA NORVEGICA, L. (Cinque-foil.)

Everywhere abundant in fields and along the roadsides, but not observed on Cacouna Island. Flower.

POTENTILLA PALUSTRIS, Scop. (Marsh Five-finger.)

Somewhat common in the marsh near Cacouna Point. Fruit.

POTENTILLA FRUTICOSA, L. (Shrubby Cinque-foil.)

Only one isolated patch of this plant, covering an area of about thirty feet square, was found in the low ground near the marsh at Cacouna Point. Fruit.

POTENTILLA TRIDENTATA, Ait. (Three-toothed Cinque-foil.)

An abundant species on Cacouna Island, where it grows in the crevices of ledges and between rocks, extending in great abundance quite to the summit. It was not observed anywhere on the mainland. Fruit, with occasional flowers.

POTENTILLA ANSERINA, L. (Silver-weed.)

A very common species on the gravelly shore of Cacouna Island and the mainland, where it covers large areas. It is also common on dry, rocky ridges and in moist fields everywhere. Flower.

POTERIUM CANADENSE, Benth. & Hook. (Burnet.)

This plant is one of the most conspicuous features of the summer flora. Along the shore of Cacouna Island it is abundant. On the mainland it occurs in the intervales, where it often forms a dense growth for many square rods. One of the best locations for this plant is on the road to Fraserville, near the railroad crossing. Flower.

ROSA BLANDA, Ait. (Rose.)

Found somewhat sparingly, the only station being on rocky land at Cacouna Point. Only one clump, growing close to a ledge, was observed. Flower.

PYRUS AMERICANA, D. C. (Mountain Ash.)

Very common along the roadsides and in grounds about houses, where it has been utilized for ornamental purposes. It is abundant everywhere in thickets and on rocky slopes, where, however, it is always very small and badly attacked by fungus. It occurs somewhat sparingly on Cacouna Island, where it extends nearly to the summit, but always small and stunted. As found here the height ranges from 3° to 20°. Fruit.

AMELANCHIER CANADENSIS, Torr. & Gray, var. BOTRYAPIUM, Torr. & Gray. (June-berry.)

Common on Cacouna Island, where it extends to the summit. On the mainland it is everywhere found on the rocky ridges, but nowhere is more than five feet high. Fruit.

AMELANCHIER OLIGOCARPA, Roem. (June-berry.)

Common on the ridges along the shore. Both this and the previous species are very extensively attacked by fungus. Fruit.

TIARELLA CORDIFOLIA, L. (False Mitre-wort.)

Observed only in the moist woods of Pilot Hill. Leaves only.

RIBES CYNOSBATI, L. (Wild Gooseberry.)

An abundant species on the steep bluffs and along the rocky shore of both mainland and Island. Also very abundant at Cacouna Point. Fruit.

RIBES OXYCANTHOIDES, L. (Wild Gooseberry.)

This species is found near the beach on Cacouna Island, and abundantly in the thickets along the shore of the mainland, together with the preceding. Fruit.

RIBES PROSTRATUM, L'Her. (Fetid Currant.)

Very common in close thickets near the beach and also on Cacouna Island. Fruit.

*SEDUM TELEPHIUM, L. (Garden Orpine.)

Near the old stone house towards Fraserville landing there was found a patch of this plant covering several square yards. It has apparently escaped from an old garden formerly existing near by. Flower.

EPILOBIUM ANGUSTIFOLIUM, L. (Fire-weed.)

Everywhere common along the roadsides, on gravelly beaches and in the low ground of the intervales, where it extends over large areas,—the brilliant flowers forming a blaze of color which catches the eye from a long distance. On Cacouna Island it is also abundant along the shore and extends well up the dry slopes towards the summit. Flower.

EPILOBIUM COLORATUM, Michx. (Willow-herb.)

Very common in moist, low lands, along ditches and about the shore of Cacouna Island. Flower.

EPILOBIUM PALUSTRE, L. (Willow-herb.)

Common on the upland ridges and on Cacouna Island. Flower.

ŒNOTHERA BIENNIS, L. (Evening Primrose.)

Roadsides, somewhat common, and on Cacouna Island near the shore. Also common all along the shore of the mainland at the foot of the bluffs. Flower.

CIRCÆA LUTETIANA, L. (Enchanter's Nightshade.)

Very abundant in the thickets along the shore at the foot of the bluffs. Fruit.

LIGUSTICUM SCOTICUM, L. (Scotch Lovage.)

Very common all along the shore of the mainland and Island. Flower and fruit.

CŒLOPLURUM GMELINI, Ledeb.

Very common in the thickets along the shore of the mainland and Island, where it attains a height of five and six feet. Fruit.

OSMORRHIZA LONGISTYLIS, D. C. (Sweet Cicely.)

Common in thickets along the shore. Fruit.

SANICULA MARYLANDICA, L. (Black Snake-root.)

Found sparingly on Cacouna Island. Flower.

ARALIA HISPIDA, Vent. (Bristley Sarsaparilla.)

Found sparingly on dry, rocky ridges on Pilot Hill and on the rocks of the shore at Cacouna Point. Also a few specimens on Cacouna Island near the shore. Flower and fruit.

ARALIA NUDICAULIS, L. (Wild Sarsaparilla.)

Very common everywhere on the Island and mainland in moist, rocky thickets and on rocky slopes. Fruit.

CORNUS CANADENSIS, L. (Bunch Berry.)

Very abundant everywhere, presenting the greatest diversity of habitat. In the low grounds and moist woods of the intervales it is most common. It ascends the slopes of Pilot Hill and follows the wood growth to the summit of Cacouna ridge, where it is a common roadside plant, and it is even found in quantity on the dry, rocky ridges of greater elevation. In the latter situations the plants are rather small and the berries not numerous nor well formed. The favorite habitat, as farther south, is in the rich, moist woods of the rocky slopes, where the berries are large, rich

in color, and the bunches very full and compact. Occasionally a flower.

CORNUS STOLONIFERA, Michx. (Red-osier Dogwood.)

Very common everywhere along roadsides and on rocky ridges. Abundant also on Cacouna Island. Fruit.

This shrub thrives well in a variety of situations, is easily cultivated, and if well cut back for a time forms a shapely plant. It improves very materially when transplanted to the more congenial conditions of cultivation, and is well worthy of introduction as an ornamental shrub.

SAMBUCUS RACEMOSA, L. (Elder.)

Common along the roadsides and in thickets at the base of the shore cliffs of mainland. Found but sparingly on Cacouna Island. Fruit.

VIBURNUM ACERIFOLIUM, L. (Arrow-wood.)

In rocky woods somewhat common, especially along the base of the shore cliffs. It was not found on Cacouna Island. Fruit.

VIBURNUM PUBESCENS, Pursh. (Downy Arrow-wood.)

Found very sparingly on dry, rocky ridges. Fruit.

Macoun assigns the eastern limit of this species to Western Quebec, but the specimens found by me make it certain that this range must be extended somewhat.

VIBURNUM NUDUM, L.

Found sparingly on rather well drained rocky ridges. Fruit.

VIBURNUM LENTAGO, L. (Sheep-berry.)

Several shrubs along the roadside near St. Arsennes. Fruit.

LINNÆA BOREALIS, Gronov. (Twin-flower.)

Very common on rocky, wooded slopes, in moist woods everywhere. On Cacouna Island it extends up the

rocky slopes in the open thickets, nearly to the summit. Fruit.

LONICERA OBLONGIFOLIA (?), Muhl. (Dwarf Honeysuckle.)

A few specimens of this shrub were found on the low ground near the old stone house. No flower or fruit.

DIERVILLA TRIFIDA, Moench. (Bush Honeysuckle.)

Common on the higher rocky ridges and in thickets all along the shore. It apparently does not occur on the Island. Flower.

GALIUM CIRCÆZANS, Michx. (Wild Liquorice.)

Common in thickets. Not found on the Island. Flower.

GALIUM TRIFIDUM, L. (Small Bedstraw.)

Common in low grounds, especially along ditches and streams. Flower.

EUPATORIUM PURPUREUM, L. (Trumpet Weed.)

Very common in the low lands of the intervales. Flower.

EUPATORIUM PERFOLIATUM, L. (Thoroughwort.)

Common in low lands of the intervales along streams and ditches. Not found on the Island. Flower.

SOLIDAGO CÆSIA, L. (Golden-rod.)

Common everywhere in woodlands and borders of thickets. Flower.

SOLIDAGO LATIFOLIA, L. (Golden-rod.)

Everywhere in open woodlands and along roadsides. Flower.

SOLIDAGO SEMPERVIRENS, L. (Golden-rod.)

A very abundant species in the marsh near Cacouna Point. Flower.

SOLIDAGO CANADENSIS, L. (Golden-rod.)

Very abundant everywhere. Flower.

SOLIDAGO LANCEOLATA, L. (Golden-rod.)

Very common in fields and by the roadside. Apparently not found on the Island. Flower.

ASTER MACROPHYLLUS, L. (Aster.)

Everywhere in moist woodlands of both the Island and mainland. Flower.

ASTER NOVÆ-ANGLIÆ L. (Aster.)

Abundant on the borders of moist thickets everywhere. The large spring flowers form a brilliant feature of the vegetation. Flower.

ASTER CORDIFOLIUS, L. (Aster.)

Abundant throughout open woodlands and on the rocky ridges. Flower.

ASTER UMBELLATUS, Mill. (Aster.)

Everywhere common. Flower.

ASTER ACUMINATUS, Michx. (Aster.)

The most common aster of this vicinity, being found everywhere in thickets and along rocky cliffs and ridges. Flower.

ERIGERON PHILADELPHICUS, L. (Common Fleabane.)

Found sparingly in fields. Not observed on Cacouna Island. Flower.

ANAPHALIS MARGARITACEA, Benth & Hook. (Everlasting.)

Common everywhere on the island and mainland. Flower.

GNAPHALIUM ULIGINOSUM, L. (Low Cudweed.)

Very common in the moist ground of the intervales. Flower.

AMBROSIA ARTEMISÆFOLIA, L. (Roman Wormwood.)

Very common in waste places. Flower.

BIDENS FRONDOSA, L. (Beggar-ticks.)

Found sparingly in low ground, especially in the ditches near the marsh. Flower.

BIDENS CHYSANTHEMOIDES, Michx. (Bur Marigold.)

Ditches, in the low land everywhere. Flower.

ACHILLEA MILLIFOLIUM, L. (Milfoil.)

Very common on the Island and mainland, especially along roadsides and in waste places. Flower.

*TANACETUM VULGARE, L. (Tansy.)

Found occasionally in fields and waste places. Flower.

*ARTEMISIA VULGARIS, L. (Wormwood.)

Very common along the roadsides and in waste places. One of the conspicuous weeds of the locality. Flower.

*ARCTIUM LAPPA, L. (Burdock.)

Common everywhere. A great pest. Flower.

*CNICUS ARVENSIS, Hoffm. (Canada Thistle.)

Very abundant everywhere, constituting a troublesome weed. Flower.

*LEONTODON AUTUMNALIS, L. (Fall Dandelion.)

Somewhat common on Cacouna Island near the beach. Flower.

HIERACIUM CANADENSE, Michx. (Hawkweed.)

Common in fields and borders of woods on Cacouna Point. Flower.

HIERACIUM SCABRUM, Michx. (Hawkseed.)

Fields, everywhere common, also on the Island. Flower.

PRENANTHUS RACEMOSA, Michx. (Rattlesnake-root.)

Abundant on the shore of Cacouna Island, 6'–18' high; also along the shore of the mainland. Flower.

PRENANTHES ALBA, L. (White Lettuce.)

Very common in the moist, rich woods of the island and mainland. Flower.

*TARAXACUM OFFICINALE, Weber. (Dandelion.)

A most abundant weed everywhere. Flower.

LACTUCA LEUCOPHŒA, Gray. (Lettuce.)

Moist thickets along the shore, common. Not found on the island. Flower.

*SONCHUS OLERACEUS, L. . (Sow-thistle.)

Common everywhere, roadsides, about dwellings and in fields. Also on Cacouna Island. Flower.

*SONCHUS ARVENSIS, L. (Sow-thistle.)

Very common in fields everywhere and near the shore on Cacouna Island. This plant is particularly abundant in grain-fields, where it covers large areas, to the great detriment of the crops. Flower.

CAMPANULA ROTUNDIFOLIA, L., var. ARCTICA, Lange. (Harebell.)

Abundant everywhere on bold cliffs and dry, rocky hills. Particularly abundant along the rocky shore. On Cacouna Island it is very abundant on the rocky slopes, extending nearly to the summit. Also common in dry, rocky fields. Flower.

VACCINIUM PENNSYLVANICUM. Lam. (Blueberry.)

A very common species on all the dry, rocky slopes and ridges. On Cacouna Island it is also very abundant, extending to the summit, where the fruit is several days later than on the mainland and along the shores of the island. Fruit.

One of the species supplying the blueberries of the market.

VACCINIUM CANADENSE, Kalm. (Blueberry.)

Low grounds, everywhere common, furnishing large, luscious berries in great abundance. The principal source of the market supply. Fruit.

VACCINIUM VITIS-IDÆA, L. (Mountain Cranberry.)

Somewhat common on the cliffs near the shore, but in these situations it seems to fruit sparingly. Abundant on the dry, rocky ridges and on Pilot Hill. Very abundant on Cacouna Island, extending to the summit over exposed ledges, where it fruits very freely. It is also found very sparingly in the low

ground among alder tickets, with *Chiogenes*, but it does not fruit well in such situations. Fruit.

The berries of this plant are very attractive, and may be eaten, though their flavor is not sufficiently fine to be attractive.

VACCINIUM OXYCOCCUS, L. (Small Cranberry.)

Not very common. Found in sphagnous swamps on the road towards Green River. No flower or fruit.

CHIOGENES SERPYLLIFOLIA, Salisb. (Snow-berry.)

Very common in low grounds, sparingly on rocky ridges in dry woods. Not observed on the Island. Fruit.

The berries of this plant are not very abundant, and are generally more or less hidden by the surrounding vegetation, so that they are somewhat difficult to find. They are a brilliant white, however, and possess an aromatic flavor like wintergreen, on account of which properties they are highly esteemed in Newfoundland,[1] where it is a common practice to make a most delicate preserve of them. The fact that an entire day is often required to procure one quart of berries makes the preserve a very choice article.

ARCTOSTAPHYLOS UVA-URSI, Spreng. (Bear-berry.)

Dry rocky ridges near the shore. Only a few plants found. Fruit.

CASSANDRA CALYCULATA, Don. (Leather-leaf.)

Very common in low, wet ground. Fruit.

EMPETRUM NIGRUM, L. (Black Crowberry.)

A distinctly Arctic species which here flourishes in abundance on Pilot Hill, on the dry, rocky crests of the various ridges, about the shore near Cacouna Point and all over Cacouna Island. It fruits very freely. Fruit.

[1] "Garden and Forest," vol. i, p. 57.

KALMIA AUGUSTIFOLIA, L. (Lamb-kill.)

This plant, which often proves such a serious element of danger to sheep, is here found in great abundance. It occurs in large quantity on rocky ridges, in low ground, and everywhere throughout the woody thickets of Cacouna Island, extending to the summit. Flower and fruit.

LEDUM LATIFOLIUM, Ait. (Labrador Tea.)

Everywhere common on rocky ridges and in lowlands of the intervales. On Cacouna Island it extends from base to summit. The leaves of this plant are dried and infused as a beverage under the name of Labrador tea, the practice being in full force in the Maritime Provinces at the present time. A sample of such tea recently sent me by Mr. G. U. Hay, of St. John, New Brunswick, shows that it consists of the leaves, dried naturally, and exhibiting all their ordinary characteristics, so that they are at once recognizable, together with many of the smaller branches, showing that no particular care is taken in the collection to have the tea consist of pure leaf.

CHIMAPHILA UMBELLATA, Nutt. (Pipsissewa.)

One specimen only, was found on Pilot Hill. Doubtless more would be found earlier in the season, but so conspicuous an absence of leaves at this time of year seems to point to it as being rather rare here. Flower.

MONESES GRANDIFLORA, Salisb. (One-flowered Pyrola.)

Evidently not abundant, probably out of season. Only a few plants found on Pilot Hill and near the summit of Cacouna Island. One flower. Fruit.

PYROLA CHLORANTHA, Swartz. (Pyrola.)

A few specimens only, in the moist woods of Pilot Hill. Fruit.

TRIENTALIS AMERICANA, Pursh. (Star-flower.)

Very common on the mainland and Island, chiefly in

low ground and moist woods, but also extending up the rocky slopes to the summit of the ridges. Fruit, occasional flower.

LYSIMACHIA STRICTA, Ait. (Loosestrife.)

Common in low ground along streams and ditches. Not found on the Island. Flower.

GLAUX MARITIMA, L. (Sea Milkwort.)

Very abundant on sandy beaches and in the grass bordering the same. Where this plant grows in free sand, its vegetation is very rapid. It then forms dense patches many feet square, the plants growing to a height of 12′–18′. Under such circumstances flowers are rare, and the whole character of the plant is changed in a marked degree — more so than I have ever observed elsewbere. When growing in somewhat *turfy* sand, the plants are usually less than six inches in height, they do not form tufted patches, and the inflorescence is abundant. Flower.

GENTIANA AMARELLA, L. var. ACUTA, Hook, f. (Gentian.)

This is the only gentian found. It is very abundant along the shore towards Cacouna Point, and in the moist places between rocky ridges. It was not observed on the Island. Though not a showy species, it flowers profusely and forms an attractive plant. Flower.

HALENIA DEFLEXA, Grisebach. (Spurred Gentian.)

Very common in the low land of the intervale back of Cacouna, very rarely on upland ridges. It is also common on the Island. Flower.

MERTENSIA MARITIMA, Don. (Lungwort.)

This species is very common all along the gravelly shore, where it forms frequent patches two or three yards in area, and constitutes one of the most strikingly attractive features of the shore flora. Flower.

The description of this plant as given in Gray's

Manual, revised edition, p. 364, says that the corolla is *white*, and that it is found on the sea coast, Cape Cod to Maine and northward, *scarce*. This description appears to need modification in two respects. So far as we have been able to determine the flowers are here, all of a brilliant *blue*, white having been found in no instance, although special search was made. Then, also, the great abundance of this plant here would render the term *scarce* hardly justifiable.

*MYOSOTIS PALUSTRIS, Withering. (Forget-me-not.)

Very abundant in ditches and wet grounds everywhere. Not found on the Island. Flower.

CONVOLVULUS SEPIUM, L. var. AMERICANUM, Sims. (Hedge Bindweed).

In thickets near the shore of Cacouna Island, and everywhere along the shore of the mainland. Flower.

*LINARIA VULGARIS, Mill. (Butter and Eggs.)

Found sparingly along the roadsides and in fields of the intervales. Not found on the Island. Flower.

CHELONE GLABRA, L. (Turtle Head.)

Somewhat common in low lands along streams. Not found on the Island. Flower.

VERONICA AMERICANA, Schwienitz. (American Brooklime.)

Ditches by the roadside towards Green River. Common. Flower.

EUPHRASIA OFFICINALIS, L., var TARTARICA, Benth. (Eyebright.)

Extremely common in open fields and on rocky ridges everywhere and along the shore. Also found on Cacouna Island. Flower.

RHINANTHUS CRISTA-GALLI, L. (Yellow Rattle.)

Very common on the shore of the Island, and everywhere in thickets and fields of the intervales. Also along the shore near Cacouna Point. Flower.

MELAMPYVUM AMERICANUM, Michx. (Cow Wheat.)

Common everywhere on rocky ridges. On the Island extending to the summit. Also common throughout moist woodlands. Flower.

MENTHA CANADENSIS, L. (Wild Mint.)

Common everywhere in fields and borders of woods. Flower.

LYCOPUS SINUATUS, Ell. (Water Horehound.)

Common along ditches and streams of the intervales. Flower.

SCUTELLARIA GALERICULATA, L. (Mad-dog Skull-cap.)

Occasional in moist lands near ditches and streams. Not observed on the Island. Flower.

BRUNELLA VULGARIS, L. (Self-heal. Heal-All.)

Common everywhere, especially in cultivated fields. Flower.

PLANTAGO MAJOR, L. (Common Plantain.)

Very common everywhere along roadsides and in fields, but rather small. Flower.

PLANTAGO MARITIMA, L. (Beach Plantain.)

Very common on all the gravelly beaches and in crevices of rocky bluffs and hedges for some distance above the shore. Also on the island. Flower.

*CHENOPODIUM ALBUM, L. (Pigweed.)

Everywhere common in waste places. A most conspicuous weed. Flower.

CHENOPODILM RUBRUM, L. (Coast Blite.)

Rather common on the shore of Cacouna Island and abundant on shore of mainland. Flower.

ATRIPLEX PATULUM, L. (Orache.)

Common on all the beaches. Flower.

SALICORNIA MUCRONATA, Bigel. (Samphire.)

This species of samphire is very abundant in the marsh

near Cacouna Point, and also in the more extensive marsh at the Island. Owing to the prevailing color which this plant attains with age, and its great abundance, these marshes have a very pronounced red color observable from long distances. Flower.

SALICORNIA HERBACEA, L. (Samphire.)

Very much less common than the preceding. A few specimens were found on the beach of Cacouna Island, more abundantly along the shore of Cacouna Point and on the borders of the marsh. Flower.

RUMEX SALICIFOLIUS, Weinmann. (White Dock.)

Very common all along the shore. Flower.

*RUMEX CRISPUS, L. (Curled Dock.)

On the Island near the beach. On the mainland, everywhere in fields and low ground and along roadsides. Flower.

*RUMEX ACETOSELLA, D. (Sheep Sorrel.)

One of the most common weeds in fields and waste places. Flower.

POLYGONUM AVICULARE, L. (Knotweed.)

Very common along waysides, about dwellings, and on the shore of the Island. Flower.

*POLYGONUM PERSICARIA, L. (Lady's Thumb.)

Very abundant in grain fields. Flower.

POLYGONUM ARIFOLIUM, L. (Halbert-leaved Tear-thumb.)

Common in grain-fields with the following. Flower.

POLYGONUM SAGITTATUM, L. (Arrow-leaved Tear-thumb.)

Common along brooks and ditches; everywhere in moist land. Flower.

*FAGOPYRUM ESCULENTUM, Mœnch. (Buckwheat.)

Extensively cultivated for the grain, and often escaped into waste places. Flower.

COMANDRA LIVIDA, Richardson. (Bastard Toad Flax.)

This plant was found in only one locality, on the dry, rocky ridge at Blueberry Hill, where it was fairly abundant. The bright red berries are most strikingly attractive. Fruit.

*EUPHORBIA HELIOSCOPIA, L. (Spurge.)

Extremely common along roadsides, about dwellings, and in cultivated fields and pasture lands, where it often covers several acres. Not found on the Island. Flower.

*URTICA GRACILIS, Ait. (Nettle.)

Fields near the old stone house. Flower.

MYRICA GALE, L. (Sweet Gale.)

On Cacouna Island, common; and on the mainland in moist thickets, where it often forms large clumps. Fruit.

BETULA LUTEA, Michx, f. (Yellow Birch.)

Very common in woodlands, but always small. Fruit.

BETULA PAPYRIFERA, Marshall. (Paper or Canoe Birch.)

A common tree on the mainland and Island, but everywhere small. Fruit.

ALNUS INCANA, Willd. (Speckled Alder.)

Everywhere abundant on rocky ridges and in low lands, where it forms dense thickets. On the Island, abundant to near the summit. Fruit.

POPULUS TREMULOIDES, Michx. (Aspen Poplar.)

A common tree everywhere, replacing the spruces in clearings.

POPULUS BALSAMIFERA, L. (Balsam Poplar, Tacamahac.)

Very common about dwellings and by the roadside as a shade tree.

POPULUS DILATATA. (Lombardy Poplar.)

A common shade tree in all the villages. 30° high.

PINUS STROBUS, L. (White Pine.)

A rare tree at Cacouna. Only one or two trees were found at the foot of Pilot Hill.

PINUS BANKSIANA, Lambert. (Northern Scrub Pine.)

This interesting tree is found only on Cacouna Island, where it extends in abundance from base to summit. 3°–12° high. Fruit.

PINUS RESINOSA, Ait. (Red Pine.)

Common on Pilot Hill. Not observed elsewhere. Fruit.

PICEA NIGRA, Link. (Black Spruce.)

Found with the next on the mainland and Island. They both mature at about the same height. Fruit.

PICEA ALBA, Link. (White Spruce.)

Common on all the hills and rocky ridges, constituting, with the preceding. the principal arborescent vegetation. Also abundant on the Island. Matures at 6°–20°. Fruit.

ABIES BALSAMEA, Miller. (Balsam Spruce.)

Occasionally found on rocky ridges with *Picea*, more abundantly on the Island. Apparently not very common. Fruit.

LARIX AMERICANA, Michx. (Larch. Tamarac. Hackmatack.)

Found very sparingly in low ground near Pilot Hill. Apparently not common here, and all young trees. Fruit.

THUYA OCCIDENTALIS, L. (Arbor vitæ. White Cedar.)

Sparingly distributed among the spruce growth on the mainland and Island. Everywhere small. Fruit.

JUNIPERUS COMMUNIS, L. (Juniper.)

Common on rocky slopes and ridges of both the Island and mainland. On the former it extends to the summit.

TAXUS CANADENSIS, Willd. (American Yew. Ground Hemlock.)

Somewhat abundant on Cacouna Island towards the summit. Also along the base of the cliffs near the Landing. Fruit.

MICROSTYLIS MONOPHYLLOS, Lindl. (Adder's Mouth.)

A few plants in the moist woods of Cacouna Island. Flower.

SPIRANTHES ROMANZOFFIANA, Cham. (Ladies Tresses.)

Found very abundantly in low ground anywhere; also sparingly on rocky slopes. Common in the moist woods of Cacouna Island. Flower.

HABENARIA PSYCODES, Gray. (Rein Orchis.)

Only one specimen was found in the moist thickets at Cacouna Point. Flower.

CYPRIPEDUM ACAULE. (Stemless Lady's Slipper.)

Common on dry, rocky ridges, on Pilot Hill and in the moist woods of Cacouna Island, where it was also found growing in the mossy soil of exposed rocks near the summit. The leaves only were to be found, but this is evidently one of the most abundant of the spring flowers.

CYPRIPEDIUM PUBESCENS, Willd. (Yellow Lady's Slipper.)

One specimen only, in fruit, was found in the moist woods of Pilot Hill.

IRIS VERSICOLOR, L. (Large Blue Flag.)

Very common in marsh lands near Cacouna Point, along ditches anywhere in the low lands and on Cacouna Island near the shore. Fruit.

This plant exhibits great diversity of habitat and aspect. Along the shore it commonly grows in the scanty soil, filling the crevices and hollows of rocks, and in such ceses it does not exceed 6'–8' in height, the whole aspect of the plant being such as to lead one to suspect it to be a distinct species. On Cacouna

Island it grows high up the face of the cliffs where the moisture is very scanty. The absence of flowers in all cases, rendered a satisfactory determinatiou of this plant impossible.

SMILACINA STELLATA, Desf. (False Solomon's Seal.)

Throughout moist, woody thickets of the Island and mainland, common. On the Island it extends to near the summit. Fruit.

STREPTOPUS AMPLEXIFOLIUS, D. C. (Twisted Stalk.)

Common in thickets along the base of rocky cliffs. Also on the Island in woody thickets. Fruit.

CLINTONIA BOREALIS, Raf.

Very abundant everywhere in moist thickets. On the island extending high up towards the summit. Fruit.

MAIANTHEMUM CANADENSE, Desf.

Very common in moist woods and low lands throughout the intervales. Fruit.

VERATRUM VIRIDE, Ait. (American White Hellebore.)

Somewhat sparingly found in low lands of the intervales, along streams. Not found on the Island.

TRIGLOCHIN PALUSTRIS, L. (Arrow Grass.)

In moist places on rocky ridges near the shore Apparparently not widely distributed. Not found on the Island. Fruit.

TRIGLOCHIN MARITIMA, L.

Grassy shores and along borders of the marsh at Cacouna Point. Common. Fruit.

ERIOPHORUM POLYSTACHYON, L. (Cotton Grass.)

Somewhat common in the swampy lands of the intervales toward Pilot Hill. Fruit.

SPARTINA CYNOSUROIDES, Willd. (Fresh-water Cord Grass.)

In the wet ground near the old stone house. Flower.

SPARTINA STRICTA, Roth., var. ALTERNIFLORA, Gray. (Salt Marsh Grass.)

Very common along all the beaches. Flower.

SPARTINA POLYSTACHYA, Willd. (Salt Reed-Grass.)

Common on beaches and in marsh lands above tide water. Flower.

PHALARIS ARUNDINACEA, L., var. PICTA. (Reed Canary Grass.)

A large patch near the old stone house. Fruit.

BROMUS CILIATUS, L. (Brome Grass.)

A few plants only near the beach on Cacouna Island. Flower.

LYCOPODIUM SELAGO, L.

One specimen only was found in the crevice of a bare ledge near the summit of Cacouna Island. Fruit.

LYCOPODIUM LUCIDULUM, Michx.

Sparingly found in the moist woods of Pilot Hill. Fruit.

LYCOPODIUM OBSCURUM, L.

Sparingly found in the moist woods of Pilot Hill. Fruit.

LYCOPODIUM CLAVATUM, L.

Common in the moist woods of Pilot Hill. Fruit.

LYCOPODIUM COMPLANATUM, L.

Common in the moist woods of Pilot Hill, together with the two preceding, and at Cacouna Point. Fruit.

POLYPODIUM VULGARE, L.

Very common on dry rocks, growing in the mossy crevices and hollows. The plant, as here found, is diminutive in size, rarely exceeding 2′–6′ in height. On the island it extends to the summit, and matures at 2′–3′ in height.

PTERIS AQUILINA, L. (Common Brake.)

Common everywhere in thickets. Very abundant on Cacouna Island, where it attains a height of 3°–4°.

ASPLENIUM FILIX-FŒMINA, Bernh.

One of the most common ferns. Found in moist thickets at base of rocky cliffs.

PHEGOPTERIS DRYOPTERIS, Fee.

Common on the rocky cliffs near the shore.

ASPIDIUM SPINULOSUM, Swartz.

In moist thickets of Cacouna Island and in moist woods of mainland.

ASPIDIUM GOLDIANUM, Hook.

In low grounds somewhat common.

ONOCLEA SENSIBILIS, L. (Sensitive Fern.)

Common in the low lands everywhere along streams. Not found on the Island.

OSMUNDA CINNAMOMEA, L. (Cinnamon Fern.)

Common in low grounds, especially near the marsh.

BOTRYCHIUM TERNATUM, Swartz, var. OBLIQUUM, Gray.

Only one plant found near the beach on Cacouna Island. Fruit.

EQUISETUM ARVENSE, L. (Horse-tail.)

Low grounds, common. Sterile stems only.

EQUISETUM LIMOSUM, L. (Horse-tail.)

In wet grounds along ditches on the road to Cacouna station. Fruit.

EQUISETUM SYLVATICUM, L. (Horse-tail.)

Along ditches and in low grounds, common. Not found on the Island.

Note on Leptoplastus.

By G. F. Matthew, M.A., F.R.S.C.

In the number of this journal for October, 1889, the author communicated a short paper on the "Occurrence of Leptoplastus in Acadian Cambrian Rocks," and referred two species of trilobites to that genus.

Since then, on studying the geological range of a trilobite which occurs with these two, he was led to see that there was a discordance between the range of the two species (supposing them to be Leptoplasti), and that of the third one—*Agnostus pisiformis*, L. In Sweden this species belongs to the base of the Olenus-bearing strata; but a variety (*socialis*, Tullberg) is found in the middle of the Olenus beds, and an allied species, *A. cyclopyge*, Tull., as high as the layers containing *Parabolina spinulosa*.

The range of this species of Agnostus (*A. pisiformis*) and its relatives in Sweden is thus *below* the horizon of Leptoplastus. Moreover, the Acadian form of *Agnostus pisiformis*, by its narrower pygidial rachis and other features, appears to be a somewhat more primitive form than the type of the species found so many years ago in Sweden, and therefore possibly older.

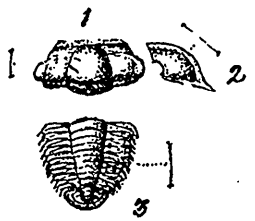
The locality in the Kennebecasis valley where these three trilobites were found was for this reason re-examined, and additional parts of the species were found. The additional material did not bear out the reference of the two species to *Leptoplastus*. *Soon after a species of trilobite found in the* St. John Basin, undoubtedly of the genus Leptoplastus, removed any doubt there might have been that these species were wrongly referred.

Angelin says of the movable cheek of Leptoplastus that it is compressed. This is true of the two Acadian species in question, but he evidently meant compressed all around; in these Acadian trilobites, however, the cheeks are compressed on the front and back only, and at the genal angle run out into a rather long spine; this was found to be

incompatible with the reference of these species to Leptoplastus.

There are reasons for including the Acadian species in Anomocare. The attitude of the genal spines, directed backward and outward, like the barbs of an arrow, the large pygidium, with narrow, many-jointed rachis, and the broad border-fold to the cheek and pygidium are not characters of Leptoplastus (except that a large, bordered pygidium is found in one species of Leptoplastus—*L. stenotus*) but they are common in Anomocare. We would therefore transfer the two species from the Kennebecasis valley to *Anomocare* as the nearest genus.

LEPTOPLASTUS LATUS. N. sp.



1. Centre-piece of the head-shield. Mag. $\frac{3}{1}$.
2. Movable cheek. Mag. $\frac{3}{1}$.
3. Part of thorax, with pygidium attached. Mag. $\frac{3}{1}$.

The new species of Leptoplastus found in the St. John Basin is remarkable for its wide head; with the movable cheek the head is nearly four times as wide as long; the pygidium, as in two out of the three Leptoplasti described by Angelin, is small; and the thorax is compact and rigid, more like Ctenopyge than the Oleni; the free cheeks are round and tumid as in the Sphærophthalmi, and the eyes are set unusually far back on the head as in the species *Sphærophthalmus alatus.*

This species is more fully described in the volume of "Transactions of the Royal Society of Canada" now in press.

Tabulation of the Igneous Rocks Based Upon the System of Professor H. Rosenbusch

By Frank D. Adams.

			Alkali Feldspar Rocks. (Orthoclase, Microcline, Anorthoclase, Albite.) With Mics, Amphibole or Pyroxene.		Alkali Feldspar-Nepheline (or Leucite) Rocks. With Mica, Amphibole or Pyroxene.	Leucite Rocks.		Nepheline Rocks.		Melilite Rocks.	Lime Soda Feldspar-Nepheline (or Leucite) Rocks.		Lime Soda Feldspar Rocks.				Rocks containing no Feldspathic Constituent. (Free from Alkalies.)	
													With Hornblende or Mica.		With Augite, Diallage or Hypersthene.		**Pyroxene Rocks.**	**Olivine Rocks.**
			With Quartz.	Without Quartz.		Without Olivine.	With Olivine.	Without Olivine.	With Olivine.		Without Olivine.	With Olivine.	With Quartz.	Without Quartz.	Without Olivine.	With Olivine.		
Abyssal (Plutonic) Rocks.	**Hypidiomorphic Granular Structure.**		**Granite.** Muscovite Biotite Granite or (Granite proper.) Biotite Granite (Granitite) Augite Granitite. Hornblende Granite. Riebeckite Granite.	**Syenite.** Mica Syenite. Augite Syenite. Hornblende Syenite.	**Eleolite Syenite.** **Leucite Syenite.**				Iolite.		**Theralite.**		**Quartz Diorite.** Quartz Mica Diorite. Quartz Hornblende Diorite. Quartz Augite Diorite.	**Diorite.** Mica Diorite. Hornblende Diorite. Augite Diorite.	**Gabbro** and **Norite.**	**Olivine Gabbro** and **Olivine Norite.**	**Pyroxenite.** Diallagite. Bronzitite. Hypersthenite. Websterite (Enstatite and Diallage). Hornblendite (Augite and Hornblende).	**Peridotite.** Picrite (with Augite). Amphibole (with Hornblende). Wehrlite (with Diallage). Harzburgite (Saxonite) with Bronsite. Lherzolite (with Diallage and Bronsite). Dunite (with Chromite).
Dyke Rocks.	**Panidiomorphic or Porphyritic Structure.**	Granitic.	Pegmatite. Aplite. Quartz Tinguaite.	Bostonite.	Tinguaite. Leucite Tinguaite.								Malchite.					
		Granite Porphyritic.	Granite Porphyry.	Syenite Porphyry.	Eleolite Syenite Porphyry. Leucite Syenite Porphyry.							* These rocks contain very little Feldspar or Nepheline, but have an unindividualized base which would probably crystallize out as Feldspar and Nepheline if the crystallisation was sufficiently far advanced. Some of them may be more nearly allied to the Nepheline Rocks.	Diorite Porphyrite					
		Lamprophyritic.		Minette. Vogesite.						Alnoite	Fourchite.*	Monchiquite.*	Kersantite. Camptonite.					
Effusive (Volcanic) Rocks.	**Porphyritic Structure.**	Older.	**Quartz Porphyry.**	**Quartzless Porphyry.** Keratophyre.									**Quartz Porphyrite.** Quartz Mica Porphyrite. Quartz Hornblende Porphyrite.	**Porphyrite.** Mica Porphyrite. Hornblende Porphyrite. Enstatite Porphyrite.	**Diabase.** Leucophyre. Quartz Diabase. Proterobase. Enstatite Diabase. Sahlite Diabase. Spillite. **Augite Porphyrite.** Augite Porphyrite (proper). Diabase Porphyrite.	**Olivine Diabase.** **Melaphyre.**		**Picrite Porphyrite.**

Notes to Accompany a Tabulation of the Igneous Rocks based on the System of Prof. H. Rosenbusch.

By Frank D. Adams, Lecturer in Geology, McGill University.

Of all the plans proposed from time to time by various authors for the classification of the Igneous Rocks, that by Prof. Rosenbusch of Heidelberg is the one which has met with the greatest favour, and is now adopted by almost all petrographers throughout the world.

The classification proposed in the first edition of this author's "Mikroskopische Physiographie der Massigen Gesteine," published in 1877, was altered in some essential particulars in his second edition of the work published in 1887, while the great advances in petrographical knowledge since that date have led to the adoption of still further modifications in the classification adopted for the unique collection of rocks which he has brought together in the museum of the Geological Institute of the University of Heidleberg.

Having drawn up a table incorporating the latest results in this field in a condensed form, for the use of my students at McGill College, I have ventured, at the request of a number of American petrographers whom I consulted while constructing it, to publish it with a few words of explanation, in the "Canadian Record of Science," that it might be available for the use of students elsewhere. It is based upon and in a general way resembles a table published by Prof. Rosenbusch in 1882, in the "Neues Jahrbuch für Mineralogie, &c."

There has recently been a tendency among petrographers to consider rocks rather from a chemical than from a mineralogical standpoint, as geological units having a certain chemical composition rather than as aggregates of certain mineral species. This is in part owing to the fact that magmas of diverse composition may crystallize out in very similar mineral aggregates, thus for instance, a mod-

ern volcanic rock composed of Sanidine and ordinary Augite, will have quite a different chemical composition from one containing large amounts of Anorthoclase and Acmite, although both, being compounds of an alkali feldspar and pyroxene, would be Trachytes if classified according to mineralogical composition. In the same way we have in the Augite Syenites a series of rocks presenting great diversities in chemical composition as well as in petrographical relationship. At present, however, a purely chemical classification presents many difficulties. A knowledge of the exact chemical composition of many rocks is wanting, while for practical purposes it would be impossible to adopt any method of classification which requires a complete chemical analysis of a rock before its name and proper position could be ascertained. Mineralogical composition and structure must still be important factors in any scheme which is to be generally adopted.

In the accompanying table, however, a classification according to chemical composition has in a general way been secured. On the left we have rocks rich in alkalies, principally potassa. Going toward the right in the table we have, first, rocks in which this alkali is largely replaced by soda (the Leucite rocks, however, forming an exception) then those in which this alkali is associated with progressively larger proportions of lime, while on the extreme right are rocks which are free from all alkalies, but in which lime magnesia and oxide of iron are present in large amount. Speaking generally, moreover, it may be said that the rocks decrease in acidity from left to right, the principal exception being the small group of Nepheline, Leucite and Melilite rocks.

In order to bring out these chemical relationships as clearly as possible and place the several groups of rocks in positions where their affinities are more clearly shown, I have, at Prof. Rosenbusch's suggestion, given to several groups of rocks positions other than those which they occupied in his former table, or in the last edition of his book. The Nepheline, Leucite and Melilite rocks, for example, instead

of being classed with the Peridotites, to which they are not related, under the general heading of "Rocks containing no Feldspar," have been placed immediately after the Orthoclase Nepheline (or Leucite) rocks and before the Plagioclase Nepheline (or Leucite) rocks. In this way all the rocks containing Nepheline and Leucite are kept together in the table, instead of being separated as before by the Diorites and Gabbros, which are much more nearly related to the Pyroxenites and Peridotites which now succeed them.

In the Heidelberg collection, moreover, the Diabases have been placed among the Volcanic rocks instead of with the Plutonic rocks. The anomalous position of these rocks when classed as Plutonic rocks—shown by the frequent occurrence in them of amygdaloidal structure, their stratigraphical position as flows and their association with tufa—was always evident, their character, as well as their structure, show that they should be classed among the old Volcanic rocks.

The Tinguaites, as well as some of the Acmite Trachytes and the Alnoites in this collection, have also been placed among the Dyke rocks.

Since the publication of the second edition of the "Massigen Gesteine," moreover, a number of massive igneous pyroxenic rocks occurring in different localities have been accurately studied by several petrographers.[1]

This has necessitated the enlargement of the table and the separation of the Pyroxene rocks from the Olivine rocks with which they were formerly classed. These have accordingly been erected into a new group—the Pyroxenites—a name first applied by Dr. Sterry Hunt, in 1862 (see Geology of Canada, 1863, p. 667, etc.), to certain eruptive rocks from Rougemont, Montarville and Mount Royal, members of a series of old volcanic cores situated in the

[1] Hatch—Quart. Jour. Geol. Soc., May, 1889.
Teall—British Petrography, pp. 71 and 84.
Hutton—Roy. Soc. New South Wales, August, 1889.
Williams—American Geologist, July, 1890.

Province of Quebec. He also, however, applied the name to certain more or less massive rocks associated with the limestones of the Laurentian system, and of which the eruptive origin is not by any means certain.

Some gaps in the classification have lately been filled by the discovery of new rocks, these have been placed in their respective places in the table. Among them may be mentioned Malchite, a rock among the Diorites corresponding to Aplite, which will be described shortly by Prof. Osann in one of the Reports of the Geological Survey of Baden. Also the rock described by Ramsay from Finland, under the name of Iolite. This latter is a coarsely crystalline rock composed of eleolite, hornolende and aegerine, which thus corresponds to Nepheline Basalt in the Plutonic series but which also contains garnet.

Two other very interesting rocks which have lately been described are Fourchite [1] and Monchiquite. [2] These have an unindividualized base, in which are embedded phenocrysts of augite, with amphibole or biotite. In Monchiquite, olivine is also present. They therefore contain no "feldspathic constituent," and might on that account seem more properly to be considered as the Dyke rocks of the Pryoxenite and Peridotite series. Having, however, quite a different composition from these rocks, and being in no way related to them, they have been classed as the Lamprophyric dyke rocks of the Theralite series, where they properly belong, since, judging from the chemical composition, it is probable that the base would have crystalized as plagioclase and nepheline had the rock become completely crystallized.

It will be seen, then, that in the accompanying table the Igneous rocks are first classified in three horizontal columns, according to their structure or the depth at which they have solidified, as Abyssal (Plutonic) Rocks, Dyke

[1] J. Francis Williams—"The Igneous Rocks of Arkansas," Annual Report of the Geological Survey of Arkansas for 1890, vol. ii.

[2] M. Hunter and H. Rosenbusch—"Uber Monchiquite, ein Camptonitisches Ganggestein aus der Gefolgschaft der Elaeolithsyenite," Tschermak's Min. und Pet. Mitth. xi, 1890.

Rocks and Effusive (Volcanic) Rocks. The structures characteristic of each of these groups is stated. They are then classified in eight vertical columns, according to their mineralogical and chemical composition, into rocks having as an essential constituent an Alkali Feldspar; an Alkali Feldspar with Nepheline or Leucite; Nepheline Rocks; Leucite Rocks; Melilite Rocks; Rocks composed essentially of Nepheline or Leucite and Plagioclase; Plagioclase (or Soda Lime Feldspar) Rocks; and lastly, Rocks containing no Feldspathic Constituent.

These rocks are then subdivided according to the bisilicates and micas which they contain, while further subdivisions are made in the case of the more acid rocks by the presence or absence of quartz, and in the case of the basic rocks by the presence or absence of olivine.

The part of Prof. Rosenbusch's scheme of classification which has met with the most adverse criticism is the group of the Dyke Rocks. It seems rational to suppose, however, that since in an extinct volcano we have a crack, pipe or dyke, at the lower end of which we have typical Plutonic rock, and at the upper end typical Volcanic rock, and since these two rocks differ widely in structure, that we might have in the intervening position a rock or rocks with a peculiar structure of their own. Prof. Rosenbusch believes, after the study of a great series of dykes, that these rocks have certain distinct structures of their own, and that although in some cases rocks exhibiting these structures occur as facies of Abyssal or Effusive rocks, as, for instance, about the borders of Plutonic masses, yet as independent geological units rocks possessing these structures never occur except in the form of dykes. These rocks which he believes cannot properly be referred to either of the other classes, he has placed together by themselves as Dyke Rocks. In some cases, as in the Aplites and the Minettes, they have pronounced and easily recognized characters, in others the characters approximate more nearly to those of the Plutonic or Volcanic rocks. Following Prof. Rosenbuch, these Dyke Rocks have been divided into

three series—the Granitic, the Granite-Porphyritic, and the Lamprophyritic Dyke rocks. These three series have been arranged in horizontal rows—separated merely by spacing, not by lines.

The division of the Volcanic rocks into older and newer is still retained, although but little stress is laid upon it, hence in the table these two divisions are separated by an *interrupted* line. In many cases rocks of these two classes cannot be distinguished from one another, but in other cases they present differences (generally due to partial alteration) by which they are characterized. As geologists have been accustomed to give special names to rocks possessing these special characters, the distinction may for the present at least be retained as convenient. Thus although Liparite may be identical in all essential respects with Quartz Porphyry, geologists are not yet prepared to abandon either term. Both rocks have certain characters which renders a special name advantageous, although these characters have little or no value for purposes of classification.

In constructing such a table it becomes very difficult to decide just how much detail in classification should be included and how much left out. If too little is put in, the table is of no value to any but those desiring the most elementary knowledge of the subject, while too much detail renders the table too complicated and cumbersome. I have therefore made it a general rule to omit in the subordinate classification names based merely on structural differences, *e.g.*, Nevadite, Granophyre, etc., and to employ only those based on the actual differences of composition. One or two exceptions have been made in the case of rocks which seemed of especial importance. In this way, many names which would serve only to confuse the student are omitted, while most of those of real importance are retained. The attempt has also been made by employing several kinds of type to bring out prominently the chief subdivisions and more important rocks, and to classify the others in a general way according to their importance. In a few cases also, where a rock is merely a variety of those immediately pre-

ceding it (*e.g.*, Augite Granite), or where a series of names coming under a more general heading do not make up a complete sub-classification, but merely indicate a series of independent varieties (as in the case of Diabase), the type has been shifted out of line to draw attention to the fact.

In conclusion I desire to acknowledge the assistance which I received in constructing this table from Prof. Rosenbusch, who has devoted much time and thought to it. Most of what there is of value in it originated with him. It must, however, as Prof. Rosenbusch remarks, still be regarded as of value rather for determinative purposes, and not as a thoroughly satisfactory scheme of classification, which is a thing to be looked for in the future. It is hoped, however, that it may be one further step toward this goal.

I also desire to acknowledge my indebtedness to Prof. Geo. H. Williams of Johns Hopkins University, as well as to the late Dr. J. Francis Williams of Cornell University, who have kindly aided me by several valuable suggestions.

A Note on the Collection of Sediments in Potable Waters.

By R. F. Ruttan, B.A., M.D.

A point of considerable importance, but one frequently overlooked by the analyst, is the microscopic examination of the sedimentary matter occurring in drinking water. This is generally described as "slight" "heavy" etc., and little or no serious effort made to determine its general nature. One explanation of this common omission is that, as a rule, the quantity of sedimentary matter in a potable water is very small and consequently very difficult to collect for examination in a satisfactory way.

The methods usually employed for collecting and estimating the traces of suspended solids present in most potable waters are all open to objections. They are inefficient or difficult of application. Probably one of the best, certainly the one most frequently used, is to allow the vessel in which

the water was collected—say a Winchester quart—to stand some hours undisturbed and then to syphon off the supernatant clear water leaving about half an inch between the short end of the syphon and the sediment. This residual water is then well shaken up and with the suspended matter poured into a conical glass capable of holding about 200 or 250 c.c. After again allowing it to stand a few hours, the sediment may be drawn up by a pipette and examined.

Apart from the time and attention required by this method, it has another objectionable feature; the current produced by the syphon in action invariably separates a considerable portion of the lighter and more floculent part of the deposit and carries it away.

The accompanying diagram[1] illustrates the simple contrivance the writer has had constructed for collecting and estimating water sediments in connection with the analysis of the Montreal water supply now being made.

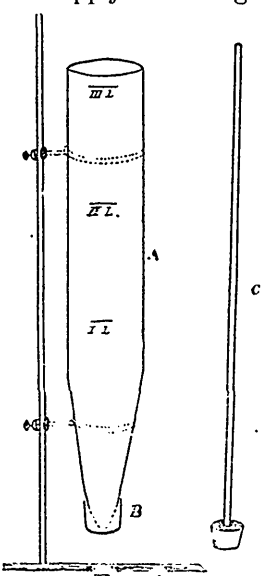


Fig. 3.

[1] This apparatus is manufactured by Max Kæhler and Martini, Berlin.

The apparatus consists of a tube about 60 ctm. long and 10 ctm. in diameter. The tube is cylindrical for about three fourths of the length, for its remainder the sides gradually converge until the lower opening is less than 5 ctm. in diameter. On this smaller end is carefully ground a glass cap which is conical internally, and externally has a flat bottom to enable it to stand like a cup.

In addition to the tube and cap there is a glass rod firmly inbedded at one end in a rubber stopper (*c*) that exactly fits the lower opening of the tube from the inside.

The tube will hold about 3 litres but is graduated to contain 1 and 2 litres in case of a limited supply or a very heavy sediment.

To use the apparatus the cap is carefully adjusted, the samples thoroughly shaken and the tube filled to the containing mark. It is then covered and suspended quite perpendicularly in the rings of a large Bunsen stand. If the tube be properly constructed all but a mere trace of sediment will have gathered into the cup at the bottom within a few hours. It has been my custom to examine these tubes at the end of four or five hours, and if there is any visible deposit on the sides to give a gentle rotatory motion to the water and again leave them undisturbed for several hours when, as a rule, not a trace of sedimentary matter will be found out of the cup at the bottom.

To obtain the sediment the stopper is introduced quietly from above by means of the rod, and the cup is at once detached without losing any water or disturbing the sediment.

There is thus obtained the sediment of three litres of water in about 50 cubic centimeters ready for microscopic examination or quantitative estimation. By means of a tared filter the sediment can be filtered off, dried and weighed in a few hours.

NOTE.—Some time after this apparatus was shown at the Natural History Society, my attention was called at Ottawa to a tube of similar design invented by Dr. Wynter Blyth, and figured by him in his Hand-book on Foods. Dr. Blyth's tube is quite small, and the slope very much greater, the

cup not larger than $\frac{1}{2}$ of an inch in diameter, the opening at the bottom of the tube is closed by a ground glass plug which being ground in offers a rough surface on which the particles of sediment would certainly lodge. The design, however, is in either respect quite similar to the one described above.

Short Notes on some Canadian Minerals.[1]

By W. F. Ferrier, B.A.Sc., F.G.S., Geological Survey of Canada.

(Communicated by permission of the Director.)

It is the intention of the writer in the following short notes to place on record a few new localities of some Canadian minerals, and also to call attention to the interesting forms in which, in several instances, they occur at these and other localities already known.

1. Native Arsenic.

A year ago a specimen was received from Mr. Charles Brent, Mining Engineer, of Port Arthur, Ont., which contained this mineral in some quantity.

The locality is given as Edwards Island, Thunder Bay District, Lake Superior, nine miles east of Silver Islet, and the ore, of which the arsenic forms a part, is said to have yielded in selected samples as high as 130 oz. silver to the ton, the average being about 75 oz.

The arsenic occurs, in the specimen examined, in small reniform masses, tarnished to a dark-grey color and imbedded in a white cleavable calcite which forms small patches in a dark-grey, fine-grained, crystalline limestone.

It greatly resembles in appearance that found at Joachimsthal, in Bohemia.

Blende, galenite, pyrite, and chalcopyrite were observed as associated minerals, and native silver is also said to occur rather plentifully with it.

The Silver Islet Consolidated Mining and Land Co. during

[1] One of the species described, the Molybdenite, is from Labrador.

the past year did considerable development work on the property with a view to working the ores for silver, but nothing is being done at present.

Only one other recorded occurrence of this interesting species in Canada has come under the writer's notice, viz: that from the Fraser River, British Columbia.[1]

2. MOLYBDENITE.

Some time ago a specimen of this mineral, collected by Mr. J. D. Frossard, Mining Engineer, Montreal, in Labrador, was placed in my hands by Mr. B. T. A. Bell of the "Canadian Mining Review."

It is interesting as a contribution to our knowledge of the minerals of that little known land. It occurs in broad foliated plates and nodules in a light colored, rather coarsely crystalline granitic rock which at first sight closely resembles a crystalline limestone, or dolomite, but is almost wholly composed of quartz and felspar.

3. SPHALERITE OR BLENDE.

During the past summer several good specimens of this sulphide of zinc were collected by the writer from the quartz veins in the townships of Risborough and Marlow, Beauce Co., Quebec, described by Dr. Ells in his report on that region.[2]

Some very fine crystals were observed, but it was found impossible to obtain perfect specimens of them, as they are exceedingly fragile and imbedded in a very hard and compact quartz.

Twinned octahedra up to an inch in diameter occur, having the planes very smooth and angles sharply defined.

The best specimens were obtained from the "Armstrong" vein, mentioned in Dr. Ell's report.

4. PYRITE.

Crystals of this well-known mineral lately found by Mr.

[1] Ann. Report Geol. Surv. Can. 1886, Part T, p. 9.
" " " " " 1887-88, Part R, pp. 106, 161.

[2] Ann. Report Geol. Surv. Can. 1886, Part J, p. 59.
" " " " " 1888-89, Part K, p. 77.

H. M. Ami at Perkins Mills, Templeton, Ottawa Co., Quebec, though not of very large size, (about ½ in. diameter) are remarkable for their perfection, and brilliancy of lustre.

They exhibit the faces of the cube and octahedron (∞ 0,0) the former being more extensively developed than the latter.

5. MARTITE.

Mr. A. M. Campbell of Perth, Ont., sent me some octahedral crystals from the Dalhousie Iron Mine, on lot 1, range 4 of the township of Dalhousie, Lanark Co., Ontario.

They proved, on examination, to consist of magnetite, partially, and in a few cases, completely, altered to hematite, though still retaining the sharp outlines of the original octahedrons of magnetite.

The crystals in which the alteration is complete may properly be referred to Martite, defined by Breithaupt as sesquioxide of iron occurring under an isometric form.

The completely altered crystals are not magnetic or only very feebly so.

Some of them are an inch and more in diameter.

Specimens which have been exposed to the weather are externally of a bright brick-red color.

6. KERMESITE.

Occurs in small radiating tufts of capillary crystals on stibnite from Rawdon, Hants Co., Nova Scotia, and exhibits all the ordinary characters of the species.

It results no doubt from the alteration of the stibnite.

Mr. C. W. Willimott first called my attention some time ago to its occurrence at this locality.

7. QUARTZ.

Of this familiar mineral some good crystals have lately been brought to light. Mr. A. P. Low, during the past summer found transparent crystals in a red pegmatite at Lac aux Iles, Portneuf Co., Quebec, which shew the com-

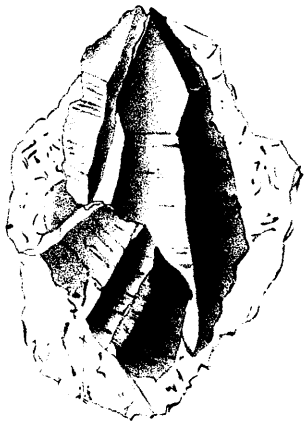


PLATE II.

QUARTZ CRYSTAL, WITH CURVED FACES (CONCAVE.)

BOUCHETTE TOWNSHIP, OTTAWA CO., QUE.

bination a = ∞ P, b=P, c = 2 P 2, the 2 P 2 faces being remarkably well developed. (See Fig. 4.)

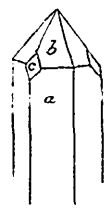


Fig. 4. Quartz Crystal—Lac aux Iles, Portneuf Co., P. Q.

Mr. John Stewart, of Ottawa, has also presented me with some interesting crystals of smoky quartz, from lot 44, range 6, Bouchette township, Ottawa Co., Quebec.

In these both prismatic and pyramidal faces are *concave*, giving the crystal the peculiar appearance shown in Plate II, which is reproduced from a drawing kindly made for me by Mr. L. M. Lambe, the artist of the Survey.

When a straight edge is laid across one of the prism faces ($\frac{1}{3}$ in. wide), the deflection of the face from its normal position, at a point half way across it, is seen to be about $\frac{1}{20}$ of an inch, the curvature being quite symmetrical.

Similar crystals have been found in Orange County, New York State.

8. Spinel.

Beautiful, brilliant, jet-black octahedrons of spinel were lately found by Mr. John Stewart, in Aylwin township, Ottawa county, Quebec, imbedded in a crystalline limestone.

Perfect crystals in my possession measure $\frac{3}{4}$ in. in diameter, and some of them exhibit the combination of octahedron and dodecahedron (o.∞ o).

A complete alteration of the mineral to some species of mica has been observed in a few instances.

9. Anhydrite and Gypsum.

Mr. H. Lundbohm of the Geological Survey of Sweden, who has recently been in Canada studying the mode of occurrence of our apatite, placed in my hands for determ-

ination some very interesting specimens of these minerals, collected by him at the "100 ton pit," McLaren's Phosphate Mine, lot 4, concession 8, North Burgess, Lanark Co., Ont.

They present all the ordinary physical characters of these species.

The anhydrite is in cleavable masses of a light purple or lilac color, and shews alteration to a snowy white gypsum, being in places, traversed by a network of little cracks filled by that mineral, a process of alteration apparently analogous to that of the serpentinization of olivine. Sometimes the alteration has taken place only in the direction of the cleavage planes, giving rise to a most beautiful banded structure, anhydrite and gypsum arranged in alternate layers.

Some good sized masses of fine-grained white gypsum occur with the anhydrite, probably derived from its alteration.

Both the anhydrite and gypsum occur in crystalline limestone, associated with apatite, and their presence in the Laurantian limestones is of special interest, opening up, as it does, many interesting questions regarding the origin of these limestones.

Hitherto the sulphates of lime seem to have been overlooked in enumerating the minerals of the Laurentian.

It is purposed to make a careful study of the mode of occurrence of these sulphates in the Laurentian limestones, and to publish any interesting facts which may be ascertained regarding it.

Ottawa, Nov. 24, 1891.

David Milne Home.

L.L.D. F.R.S.E. F.G.S. &c.

David Milne, afterwards David Milne Home, was born January 22nd, 1805, and died, full of years and honours, on September 19th, 1890. His father was a captain in the Royal Navy, a distinguished officer, afterwards Admiral Sir David Milne, and David was the eldest son, and from

his youth a thoughtful boy and diligent student. On completing his University course at Edinburgh, he entered on the study of Law, and for some years practised successfully in Edinburgh, holding for a time the honourable post of Advocate depute. After his marriage to Miss Home and the death of his father, he retired from legal business and devoted himself to country life, in which he bore himself as the highest type of an educated Scottish country gentleman.

Deeply religious and an elder of the Presbyterian church, he took an active part in the stirring church movements of his time, and in many other departments of Christian work, as the Bible Society, the Sunday School Union, and the Scottish Christian Knowledge Society. He was a zealous educationist and agriculturist, and keenly alive to the importance of science in agriculture, and was active in county business. He was early attracted to the study of geology, and made its pursuit the main recreation of his life; devoting himself more particularly to the local geology and archæology of the South of Scotland, and to the questions relating to the boulder-clay and other glacial deposits. He was the chairman and organiser of the Boulder Committee of the Geological Society of Scotland, and his reports on that subject are widely known and valued. As a student of Pleistocene geology he was eminently rational and conservative, and advocated moderate views as to the Glacial period in opposition to the extreme glacialists.

At the time of his death he was the President of the Edinburgh Geological Society, and Vice-president of the Royal Society of Edinburgh. He was a chief promoter of the Ben Nevis Meteorological Observatory, and of the Marine Station at Granton, and was President of the Berwickshire Field Club. The writer of this notice had an opportunity, by his invitation, to attend one of the excursions of this club, and at the same time to enjoy the hospitality of the President and his family at his seat of Milne Graden in Berwickshire, and to visit with him some interesting "Kaims" and other superficial deposits. The

above is a very slight sketch of Mr. Milne Home's multiplied labours and public engagements. He was the author of many reports, public addresses, and memoirs on a great variety of geological, archæological, and other scientific subjects; and from his position and personal character exercised a large influence in favour of science and education in Scotland.

The few facts above stated are gleaned from the well-written biographical sketch from the pen of his accomplished daughter, Miss Grace Milne Home;[1] in which will also be found interesting notices of the geology of Berwickshire, and letters from eminent geologists and other scientific men, with whom Mr. Milne Home was in correspondence.

J. W. D.

Addenda to Sir W. Dawson's Paper on the Trees Growing on the Grounds of McGill University.

In the discussion I was reminded that I had omitted two of our most useful and beautiful shrubs, the Mahonia, *Berberis aquifolium*, and its ally, *B. vulgaris*, both of which may be said to have been naturalized on the College grounds and spread themselves at their own discretion. The former in particular is interesting as our best substitute for Holly, which in its foliage it much resembles. It is an evergreen, but its leaves are liable to be killed in winter if not covered with snow. When planted in a low and sheltered place, likely to be well covered with snow in winter, it spreads freely and its leaves preserve their greenness, so that it may be gathered at Christmas; and it will come out bright and uninjured from under the snow in spring. With a few of the berries of the tree cranberry, which remain red and perfect all winter, it may be made to do duty very well for the traditional holly of the mother country.

It was also noticed in the discussion that the growth of trees in this climate is very rapid. A young man who plants well selected trees may, before he is middle aged, have large and useful plantations; and belts of forest trees,

[1] Douglas, Edinburgh, 1891.

if judiciously planted, besides their other uses, are invaluable for shelter and for protecting fruit trees.

Young seedling trees are the best, as they soon gain on older trees which have been removed, and are more beautiful and shapely. Many of our best forest trees are quite easily propagated from the seed, and abundance of healthy seedlings can often be collected under old trees.

Much is to be said, both on the score of economy and beauty, in favor of hedges instead of fences; and if the native thorns are to be used, the best will probably be *C. tomentosa*, the pear or apple haw, from its vigorous growth and compact habit. Some varieties of this species also produce a large and edible fruit.

A pleasant feature connected with such trees as the Sumach, the Rowan tree and the Tree-cranberry, is that they attract winter birds, and thus enliven the shrubbery at a time when living things are least abundant in our woods and grounds.

The planting and culture of trees, and the disposal of them for utility and adornment were referred to by several speakers in the discussion, and it is hoped may form the subject of a separate paper by some member having the requisite experience and scientific knowledge.

Proceedings of the Natural History Society.

The regular monthly meeting was held on Monday evening October 26th., Mr. J. H. Joseph, Vice-President, in the Chair. The minutes of the annual meeting were read and approved, also minutes of the council meetings of May 21st and Oct. 19th.

Letters from Dr. Harrington and Mr. Frank D. Adams were read, resigning the offices of President and Secretary respectively.

It was moved by Mr. J. Stevenson Brown, seconded by Mr. J. A. U. Beaudry, that "in accepting the resignation of Dr. Harrington the society regrets that he cannot act as President for another year. The Society also takes this op-

portunity of thanking Dr. Harrington, not only for the efficient manner in which he has discharged his duties as President, but also for the work he has done for the Society in the past and for the interest he still continues to show in its welfare."

It was resolved to suspend the by-law on balloting and on motion of the Hon. Edward Murphy, seconded by Major L. A. H. Latour, the Very Rev. Dean Carmichael was elected President.

It was then moved by Mr. Geo. Sumner, seconded by Mr. J. A. U. Beaudry, that Dr. Harrington be elected Vice-President. Carried.

Mr. J. Stevenson Brown then moved, seconded by Mr. J. A. U. Beaudry, that the recommendation of the Council accepting the resignation of Mr. Frank D. Adams as Recording Secretary and the appointing of Mr. R. W. McLachlan in his place, and Mr. Frank D. Adams as member of the Council be adopted. Carried.

A letter from the Citizens' Royal Society Committee, was read, offering the Society a cheque for $300.00 and the books and vouchers of the committee, on condition that the Society should undertake to settle any accounts that may still remain unpaid. On motion the offer was accepted.

The Curator reported the following additions to the museum :—Woodchuck, black variety, from Mr. Griffin ; Brown Thrasher, from E. D. Wintle ; Wood Thrush and Yellow legs, from F. B. Caulfield ; Nest of the longbilled Marsh Wren, from E. D. Wintle ; A Land Crab found in a bunch of bananas. A Lamellibranchiate fossil from the Hudson River formation, Georgetown, Ont., from C. A. Walker ; Red Shoulder Hawk (nestling), from Mr. Abbott ; Rattle Snake skin with rattles attached, from H. J. Tiffin ; a collection of insects, from Albert Holden ; Natural products from the Islands of Jamaica and St. Vincent, from John Fulton ; Specimens of Asbestos and Phosphates, East Templeton, from A. M. Perkins, and a cocoon of silk worm and silk from Mr. Griffin. The thanks of the Society was ordered to be sent to the donors.

The usual exchanges were reported by the Librarian.

Messrs. F. X. Langelier and W. E. Boustead were elected ordinary members.

Mr. F. B. Caulfield then read a paper entitled "A few Notes on Additions to our Museum." It was moved by Mr. J. Stevenson Brown, seconded by Mr. J. A. U. Beaudry that the thanks of the Society be tendered to Mr. Caulfield for his interesting paper.

The meeting then adjourned.

Proceedings of the Microscopical Society.

The Annual meeting of the Montreal Microscopical Society was held in the Library of the Natural History Society on Monday evening Nov. 9th.

The Secretary Treasurer reported that the membership had trebled during the year, the attendance at the meetings had largely increased, no members were in arrears, the Society was free from debt and had a cash balance on hand. It was suggested in his report that the aim of the Society be more clearly defined and that the members should consider some enlarged scheme of practical work.

During the past season papers had been read on the following subjects:—

Nov. 10th "Illumination as applied to the Microscope"
J. Stevenson Brown, Esq.

Dec. 8th "Facts connected with keeping an Aquarium"
Dean Carmichael.

Jan. 12th "Practical hints on the Microtome"
Wyatt G. Johnson, M.D.

Feb. 9th "Histology of the eye of the Owl and Lobster"
J. W. Stirling, M.D.

Mch. 9th "The Microscope and Bacteriology"
J. A. Beaudry, M.D.

April 13th "The Polariscope as applied to the separation of Starches"
G. P. Girdwood, M.D.

May 11th "The Bacteria in Montreal drinking water"
Wyatt G. Johnson, M.D.

The election of officers resulted in the re-election of J. Stevenson Brown, President; Hon. Senator Murphy, Vice-President; Leslie J. Skelton, Hon.-Secretary.

It having been decided by the committee on rules to divide the office of Secretary-Treasurer, Mr. J. S. Shearer was unanimously elected Hon.-Treasurer.

The President read his annual address and took for his subject "The Duty of Science." At its conclusion, a vote of thanks was tendered him and also to the officers of the Society for their efforts on its behalf during the year just closed.

The papers for the coming season have all been arranged for in advance and are:—

Oct. 20th "The Bacillus of Diphtheria" illustrated with apparatus for investigation and culture,
J. B. McConnell, Esq., M.D.

Nov. 9th. The President's annual address, (and Election of officers),
J. Stevenson Brown, Esq.

Dec. 14th "The use of the Microscope in the study of Fossils,"
Sir Wm. Dawson, L.L.D., F.R.S., F.G.S., &c.

Jan. 11th "Polarised Light, its usefulness in indicating structure," with lantern illustrations,
Prof. John Cox, M.A.

Feb. 8th "Crystalline forms modified by impurity,"
Jos. Bemrose, Esq., F.G.S.

Mar. 14th "The House Spider,"
Rev. W. J. Smyth, M.A., B.Sc., Ph.D.

April 11th "The American Tent Caterpillar."
A. F. Winn, Esq.

May 9th "Use of the Microscope in the identification of burnt documents,"
G. P. Girdwood, Esq., M.D., M.R.C.S., (Eng.)

Those wishing to join the Society can do so either as ordinary or associate members by addressing the Secretary, Leslie J. Skelton, 138 Metcalfe St., Montreal.

Ordinary members must be possessed of an acromatic microscope. Associate members can attend the meetings but cannot take any active part in the proceedings.

INDEX.

ABSTRACT FOR THE MONTH OF APRIL, 1891.

Meteorological Observations, McGill College Observatory, Montreal, Canada. Height above sea level, 187 feet. C. H. McLEOD, *Superintendent.*

DAY.	THERMOMETER.				* BAROMETER.				† Mean pressure of vapour.	‡ Mean relative humidity.	Dew point.	WIND.		SKY CLOUDED IN TENTHS.			Per cent. of Possible Sunshine.	Rainfall in inches.	Snowfall in inches.	Rain and snow melted.	DAY.
	Mean.	Max.	Min.	Range.	Mean.	§ Max.	§ Min.	Range.				General direction.	Mean velocity in miles perhour	Mean.	Max.	Min.					
1	36.42	44.5	25 8	18.7	30.0643	30.108	30.025	.083	.1423	66.5	26.2	N.E.	7.9	8.8	10	4	71	....	....	....	1
2	41.27	48.5	37.4	11.1	29.8753	30.000(?)	29 764	.236	.1468	57.0	27.0	S.E.	16.3	10.0	10	10	03	....	....	....	2
3	32.77	38.8	30.2	8.6	29.5513	29.764	29.441	.323	.1627	87.7	29.5	N.	26.8	10.0	10	10	00	....	5.7	0.74	3
4	32.32	35.5	25.6	9.9	29.5908	29.710	29.490	.220	.1302	70.5	23.7	N.W.	17 6	8.7	10	2	00	....	Inapp.	0.00	4
SUNDAY..... 5	.....	31.8	21.8	10.0	.. ....	.....	.....	....	....	....	....	S.W.	21.5	....	.	..	69	....	....	....	5 .....SUNDAY
6	32.12	38.1	24.7	13.4	29.8217	29.868	29.784	.084	.1077	60.7	20.0	S.W.	12.7	3.5	10	9	97	....	....	....	6
7	31 03	34.1	27.7	6 4	29.8507	29.955	29.801	.154	.1085	62.5	20.2	W.	10.5	9.8	10	)	03	....	....	....	7
8	32.05	38.3	24.1	14.2	30.1615	30.282	30.038	.244	.1068	59.3	19.7	W.	13.1	5.0	10	0	90	....	....	....	8
9	39.12	48 5	30.2	18.3	30.4408	30.484	30.350	.134	.1357	57.0	25.2	W.	0.8	0.5	3	0	97	...	....	...	9
10	42.33	53.5	28.6	24.9	30 4317	30.538	30.311	.227	.1395	53.5	25.7	S.E.	6.5	7.2	10	0	73	....	....	....	10
11	41.07	44.1	36.6	7.5	30.0797	30.265	29.902	363	.2383	92.2	38.8	S.E.	20.2	10.0	10	10	00	0.50	....	0.50	11
SUNDAY 12	.....	44.8	35.7	9.1	.....	.....	.....	....	.....	....		S.W.	20.2		..	.	00	0.63	....	0.63	12 ... . SUNDAY
13	44.58	50.0	38.1	11.9	29 9325	20.999	29.874	.125	.2312	79.0	38.2	S.W.	23.0	9.3	10	3	08	Inapp.	....	0.00	13
14	43.67	50.0	37.6	12.4	30.0638	30.127	29.917	.210	.2178	75 2	36.0	N.E.	18.6	10.0	10.	10	00	0.07	....	0.07	14
15	34.42	38.8	32.4	6.4	30 0512	30.086	30.017	.069	1853	93.2	32.7	N.E.	18.3	10.0	10	10	00	0.57	....	0.57	15
16	41.97	50.0	33.5	16 5	30.1537	30.206	30.096	.110	.2277	85.3	37.5	S.W.	12.9	8.3	10	0	13	0.05		0.05	16
17	50.75	60.1	36.6	23.5	30.1487	30.250	30.017	.233	.2445	66.7	39.3	S.W.	14.6	4.2	10	0	72	...	....	....	17
18	53.88	58.5	47.4	11.1	29.8312	29.971	29.729	.242	.3617	86.0	49.5	S.W.	15.1	8.3	10	0	03	0.45	....	0.45	18
SUNDAY.....19	.....	54.7	45.6	9.1	.....	.....	.....	....	....	....	....	S.W.	16.8	....	..	.	01	0.07	....	0.07	19 .....SUNDAY
20	47.10	54.0	40.6	13.4	30.2085	30.264	30.066	.198	.1925	59.5	33.5	N.W.	13.7	0.5	3	0	99	....	....	....	20
21	52.17	63.0	36.5	26.5	30.2047	30.332	30.031	.301	.2070	53.5	35.3	S.W.	10.9	2.3	10	0	97	....	....	....	21
22	56.83	70.0	46.5	23.5	29.6602	29.864	29.498	.366	.3317	71.7	47.3	S.W.	13 9	9 0	10	7	44	Inapp.	....	0.00	22
23	39.22	47.5	34.5	13.0	29.5367	29.664	29.456	.208	.2112	85.8	35.2	N.	17.9	8.5	10	1	00	0.04	....	0.04	23
24	39.37	50.3	30.7	19.6	29.6222	29.697	29.536	.161	.1287	54.8	23.8	N.W.	20.3	5.0	10	0	70	.....	Inapp.	0.00	24
25	36 57	42.3	29.0	13.3	29.7130	29.863	29.595	.268	.1387	66 0	27.7	N.W.	19.3	9.0	10	2	07	....	1.4	0.14	25
SUNDAY.....26	.....	56.0	36.6	19.4	.....	.....	....	....	.....	....	....	N.W.	15 9	....	..	.	66	....	....	....	26 ..... .SUNDAY
27	60.12	72.0	47.5	24.5	29.7328	29.013	29.560	.353	.2467	46.8	39 3	S.W.	20.9	1.8	10	0	89	.....	....	..	27
28	42.32	60 5	31.6	28.9	29.7322	29.865	29.575	.290	.1675	60.7	29.7	W.	30.3	7.7	10	1	13	Inapp.	Inapp.	0.00	28
29	40.73	51.5	27.7	23.8	29.8117	29.884	29.752	.132	.1155	47.0	21.5	W.	22.2	6.8	10	0	71	Inapp.	Inapp.	0.00	29
30	52.65	65.0	40.9	24.1	29.6442	29.769	29.541	.228	.2158	52.8	35.5	S.E.	8.0	2.8	9	0	92	....	....	.	30
.....Means	42.19	57.49	39.30	18.19	29.9198	.....	.....	.214	.1862	67.3	31 5	.....	16.22	6.81	..	..	41.5	2.38	7.1	3.26	Sums .....
17 yrs. means for & including this mo.	39.76	48.26	32.18	16.07	29.9411	.....	.....	.202	.1693	66.7	....	.....	....	5.90	..	..	52.0	1.64	25.0	2.30	17 years means for and including this month.

ANALYSIS OF WIND RECORD.

Direction.....	N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.	Calm
Miles.....	1394	1001	44	1091	493	4417	1917	1289	
Duration in hrs ..	76	62	8	73	36	241	121	78	25
Mean velocity....	18.3	16.2	5.5	14.9	13.7	18.3	15.8	16.5	

Greatest mileage in one hour was 59 on the 3rd.
Greatest velocity in gusts, 72 miles per hour on the 3rd.

Resultant mileage, 4635.
Resultant direction, S. 72° W.
Total mileage, 11,683.

* Barometer readings reduced to sea-level and temperature of 32° Far.
§ Observed.
† Pressure of vapour in inches of mercury.
‡ Humidity relative, saturation being 100.
¶ Ten years only.

The greatest heat was 72.0 on the 27th; the greatest cold was 21.8 on the 5th, giving a range of temperature of 50.2 degrees. Warmest day was the 27th. Coldest day was the 5th. Highest barometer reading was 30.538 on the 10th; lowest barometer was 29.441 on the 3rd, giving a range of 1.097 inches. Maximum relative humidity was 99 on the 15th. Minimum relative humidity was 29 on the 29th.

Rain fell on 12 days.
Snow fell on 6 days.
Rain or snow fell on 16 days.
Rain and snow fell on 2 days.
Auroras were observed on 3 nights.
Lunar corona on 1 night.
Fog on 1 day.
Solar halo on 1 day.

ABSTRACT FOR THE MONTH OF MAY, 1891.

Meteorological Observations, McGill College Observatory, Montreal, Canada. Height above sea level, 187 feet. C. H. McLEOD, *Superintendent.*

DAY.	THERMOMETER. Mean.	Max.	Min.	Range.	* BAROMETER. Mean.	§ Max.	§ Min.	Range.	† Mean pressure of vapour.	‡ Mean relative humidity.	Dew point.	WIND. General direction.	Mean velocity in miles per hour	SKY CLOUDED IN TENTHS. Mean.	Max.	Min.	Per cent. of Possible Sunshine.	Rainfall in inches.	Snowfall in inches.	Rain and snow melted.	DAY.
1	52.62	66.3	41 5	24.8	29.7148	29.860	29 608	.252	.2130	56.2	36.2	S.W.	17.0	1.5	9	0	84	....	....	....	1
2	53.82	63 4	42.7	20.7	29.9167	29.972	29.877	.095	.2065	51.3	35.3	S.W.	14.7	5.0	10	0	94	....	....	..	2
SUNDAY.. 3	.....	57.0	39.6	17.4	.. ....	.....	.....	....	.....	....	....	W.	15.2	....	..	..	31	0.32	....	0.32	3 .....SUNDAY
4	39.47	48.0	33.6	14.4	29.8458	29.977	29.777	.200	.1508	62.7	27.3	S.W.	28.2	6.3	10	0	50	0.05	....	0.05	4
5	36.02	42 0	31.7	10.3	29.8370	29.884	29.794	.090	.1482	69.8	27.0	S.W.	21.5	8.3	10	0	17	0.01	Inapp.	0.01	5
7	40.85	48.2	33.5	14.7	29.9202	30.032	29.878	.154	.1625	63.0	28.8	N.W.	15.9	7.8	10	2	27	0.05	....	0.05	6
6	47.18	56.4	37.1	19 3	30.0482	30.120	29.992	.128	.1400	44.2	25.7	W.	16.5	7.0	10	0	81	....	....	....	7
8	51.73	62.8	42.0	20.8	29.8637	29.999	29.763	.236	.2355	62.5	38.2	S.W.	17.3	8.5	10	4	44	Inapp.	....	0.00	8
9	52.50	61 0	48.5	12.5	29.8067	29.841	29.790	.051	.3467	87.8	47 2	S.E.	7.5	9.8	10	9	02	0.10	....	0.10	9
SUNDAY ..10	.....	80.0	46.5	33.5	.....	.....	.....	....	.....	....		S.W.	26.)		..	..	33	Inapp.	....	0.00	10 .... . SUNDAY
11	47 05	58.9	43 0	15.9	29.9610	30.032	29.891	.141	.2257	69.8	37.3	N.W.	13.2	8.3	10	0	00	0.03	....	0.03	11
12	53.87	65 9	39.9	26.0	30.0988	30.149	30.068	.081	.2302	58.2	38.0	S.W.	6.0	1.7	7	0	94	....	....	....	12
13	57.33	69.1	44.6	24.5	30 0243	30.094	29.967	127	.2275	50.8	37.7	S.W.	10.3	1.8	6	0	91	....	....	....	13
14	53.22	62.0	47.3	14.7	30.0880	30.131	29.976	.155	.1978	49.5	34.0	.....	12.0	1.2	9	0	74	....		....	14
15	58.40	72.2	41.5	30.7	29 9773	30.130	29.855	.275	.2432	48.8	38.5	S.E.	12.0	2.7	7	0	84	....	....	....	15
16	47.85	58.7	36.8	21.9	29.8388	29.913	29.711?	.202	.2755	81.5	42.0	W.	15.6	10.0	10	10	00	0.66	....	0.66	16
SUNDAY.. 17	.....	52.1	34.7	17.4	.....	.....	.....	....	.. .	....	....	W.	20.3	....	..	.	82	....	....	....	17 .....SUNDAY
18	42.63	51.0	38.5	12.5	29.8212	30.044	29.692	.352	.1727	63.5	30.0	W.	24.7	5.7	10	0	53	0.05	....	0.05	18
19	47.92	57 0	36.1	20.9	30.1900	30.242	30.115	.127	.1593	47.5	28.5	S.W.	12.1	3.3	10	0	85	....	....	....	19
20	61.07	75.8	43.3	32.5	30.2718	30.312	30.229	.083	.3508	65.0	40.8	S.	13.0	9.0	10	4	47	.....	....		20
21	66.38	74.3	59.8	14.5	30.0825	30.248	29.922	.326	5252	81.3	60.3	S.	15.2	8.7	10	6	20	0.22	....	0.22	21
22	54.17	66.0	39.5	26.5	29.9777	30.109	29.887	.222	.2700	60.2	40.0	N.	17 5	6.5	10	1	51	...	....	....	22
23	46.10	56.8	33.7	23.1	30.1425	30.207	30.092	.115	.1723	55 7	30.7	.....	9.5	0.0	0	0	95	....	....	....	23
SUNDAY.... ...24	.....	69.2	39.8	29.4	. .	.....	.....	....	.....	....	....	S.W.	10.2	....	..	..	90	....	....	....	24 ..... .SUNDAY
25	62.33	71.0	54.0	17.0	29.9152	29.965	29.868	.097	.3258	59.5	47.0	S.W.	15.9	8.3	10	4	68	....	....	....	25
26	47 55	58.0	41 6	16.4	30.0295	30.168	29.977	.191	.2540	76.3	40.2	N.	14.8	5.8	10	0	35	0.22	....	0.22	26
27	50.58	59.4	38.5	20.8	30.2028	30.297	30.129	168	.1830	49.3	32.0	S.W.	11.3	2.5	10	0	92	....	..	....	27
28	59.02	71 0	48.4	22.6	30.1207	30.171	30.066	.105	.2825	56.2	42.8	S.W.	18 0	10.0	10	10	52	....	....	....	28
29	65.65	79.8	50.7	29.1	29.9878	30.089	29.918	.171	.3867	63.0	51.7	S.	7.4	8.7	10	5	50	....	....	....	29
30	65.93	74.0	56.3	17.7	29.9137	29.940	27.881	.059	.4480	71.0	55.8	.....	7 4	7.7	10	0	16	.....	....	....	30
SUNDAY.....31	.....	75.1	51.6	23.5	.....	.....	.....	....	.....	....	....	N.E.	8.9	....	..	..	72	....	....	....	31 ..... SUNDAY
....Means	52.36	63.30	42.46	20.84	29 9845	....	.....	.162	.2513	61.72	38 5	.....	14.7	5 99	..	..	55.3	1.71	0.00	1.71	Sums ..... .
17 yrs. means for & including this mo.	54.45	63.68	45.43	18.25	29.9372	....	.....	.163	.2831	65.20	....	....	..	6.28	..	..	¶52.0	2.91	0.10	2.92	17 years means for and including this month.

ANALYSIS OF WIND RECORD

Direction.... .	N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.	Calm
Miles.....	1198	364	91	578	1419	4548	1941	803	
Duration in hrs..	84	44	21	65	103	252	114	55	1
Mean velocity....	14.3	8.3	4.3	8 9	13.1	18.0	17.0	14.6	

Greatest mileage in one hour was 48 on the 4th.
Greatest velocity in gusts, 66 miles per hour on the 1st.

Resultant mileage, 5820.
Resultant direction, S. 58.5 W.
Total mileage, 10,942.

* Barometer readings reduced to sea-level and temperature of 32° Far.
§ Observed.
† Pressure of vapour in inches of mercury.
‡ Humidity relative, saturation being 100.
¶ Ten years only.

The greatest heat was 80.0 on the 16th; the greatest cold was 31.7 on the 5th, giving a range of temperature of 48.3 degrees. Warmest day was the 21st. Coldest day was the 5th. Highest barometer reading was 30.312 on the 20th; lowest barometer was 29.608 on the 1st, giving a range of 0.704 inches. Maximum relative humidity was 99 on the 9th. Minimum relative humidity was 25 on the 13th.

Rain fell on 12 days.
Snow fell on 1 day.
Rain or snow fell on 12 days.
Rain and snow fell on 1 day.
Hoar frost on 2 days.
Fog on 2 days.

ABSTRACT FOR THE MONTH OF JUNE, 1891.

Meteorological Observations McGill College Observatory, Montreal Canada. Height above sea level, 187 feet. C. H. McLEOD, *Superintendent.*

DAY.	THERMOMETER. Mean.	Max.	Min.	Range.	*BAROMETER. Mean.	§ Max.	§ Min.	Range.	† Mean pressure of vapour.	‡ Mean relative humidity.	Dew point.	WIND. General direction.	Mean velocity in miles perhour	SKY CLOUDED IN TENTHS. Mean.	Max.	Min.	Per cent. of Possible Sunshine.	Rainfall in inches.	Snowfall in inches.	Rain and snow melted.	DAY.
1	71.38	82.1	58.1	24.0	29.7042	29.789	29.620	.169	.4542	60.0	56.3	S.W.	20.5	7.7	10	2	61	....	....	....	1
2	56.27	65.0	51.4	13.6	29.9347	29.980	29.865	.115	.2917	64.3	44.2	N.	11.6	4.3	10	0	30	....	....	....	2
3	47.08	55.1	40.4	14.7	30.1048	30.133	30.057	.076	.2132	67.8	35.7	N.E.	24.3	8.8	10	4	17	0.14	....	0.14	3
4	51.30	60.9	41.5	19.4	30.1505	30.188	30.118	.070	.1890	51.0	33.0	N.E.	14.0	1.7	10	0	82	....	....	....	4
5	53.72	64.0	43.3	20.7	30.1832	30.246	30.130	.116	.1943	48.2	33.8	W.	14.1	2.3	10	0	70	....	....	....	5
6	59.05	70.0	44.5	25.5	30.1363	30.221	30.068	.153	.2092	42.2	35.8	W.	9.8	2.0	9	0	90	....	....	....	6
SUNDAY... 7	.....	75.6	49.4	26.2	.....	.....	.....	....	.....	....	....	S.W.	11.0	....	..	..	88	....	....	....	7 ..... SUNDAY
8	68.17	82.2	54.9	27.3	30.0605	30.131	30.000	.131	.2947	44.0	44.5	S.W.	17.4	5.3	10	2	76	....	....	....	8
9	67.50	80.3	57.0	23.3	30.0178	30.077	29.973	.104	.3383	50.5	47.8	S.W.	18.3	8 0	10	4	52	....	....	....	9
10	72.08	84.8	60.4	24.4	29.9505	30.019	29.889	.130	.4665	59.3	56.5	S.W.	15.6	6.8	10	1	63	.....	....	....	10
11	71.95	86.9	64.3	22.6	29.8742	29.945	29.815	.130	.5847	76.2	63.3	S.W.	16.3	8.0	10	1	46	0.83	....	0.83	11
12	68.95	77.0	62.3	14.7	29.9108	30.013	29.858	.155	.4580	65.3	56.3	S.W.	20.1	5.8	10	0	80	0.01	....	0.01	12
13	69.32	78.7	55.4	23.3	30.0490	30.111	29.994	.117	.3995	54.7	52.8	S.W.	14.5	3.0	10	0	92	....	....	....	13
SUNDAY 14	.....	82.0	61.3	20.7	.....	.....	.....	....	.....	....	..	S.W.	23.5	....	..	..	61	....	....	....	14 ..... SUNDAY
15	74.63	86.7	64.2	22.5	29.8280	29.879	29.787	.092	.4647	54.5	56.8	S.W.	23.9	7.2	10	1	37	.....	....	.. .	15
16	74.58	90.0	67.5	22.5	29.7413	29.795	29.680	.115	.5948	69.0	63.5	S.W.	20.7	6.3	10	0	69	0.40	....	0.40	16
17	64.78	70.3	58.3	12.0	29.8668	29.893	29.843	.050	.3882	63.7	51.8	N.E.	17.9	9.8	10	7	31	0.04	....	0.04	17
18	63.38	74.5	54.4	20.1	29 8263	29.885	29.770	.115	.3812	67.0	51.3	E.	11.1	7.5	10	2	85	....	....	....	18
19	65.03	74 6	55.2	19.4	29.7627	29.785	29.734	.051	.4318	70.5	54.5	S.E.	10.0	8.0	10	1	64	....	....	....	19
20	67.53	74.8	59.3	15.5	29.8303	29.844	29.813	.031	.5198	77.2	59.8	S.E.	8.0	9.3	10	5	12	....	....	....	20
SUNDAY..... 21	.....	79.9	66.4	13.5	.. ....	.....	.....	....	.....	....	....	S.E.	6.7	....	.	..	09	0.01	....	0.01	21 ..... SUNDAY
22	69.10	74.7	66.6	8.1	29.7330	29.794	29.678	.116	.6403	90.3	66.0	S.E.	9 8	10.0	10	10	00	0.18	....	0.18	22
23	65.97	74.1	56.5	17.6	29.7125	29.863	29.646	.217	.5248	81.2	59.8	S.W.	20.4	8.8	10	3	26	0.14	....	0.14	23
24	59.53	68.2	53.6	14 6	29.9690	29.989	29.925	.064	.3852	75.8	51.8	W.	9.1	5.2	10	0	36	....	....	....	22
25	69.62	81.0	53.5	27.5	29.9015	30.020	29.791	.229	.5028	70.0	58.8	S.	6 3	1.8	8	0	79	....	....	....	25
26	66.17	77.5	53.7	23.8	29.9128	30.049	29.829	.220	.4098	62.3	52.3	N.	16.;	5.8	10	1	76	....	...	...	26
27	62.23	73.9	50.6	23.3	29.9973	30.050	29.959	.091	.3007	54.8	44.8	N.	15.3	2.2	9	0	81	....	....	....	27
SUNDAY..... 28	.....	78.5	55.3	23.2	.....	.....	.....	....	.....	....	..	N.	17.3	....	..	..	90	....	....	....	28 ..... SUNDAY
29	67.40	76.4	59.1	17.3	29.8413	29.871	29.814	.057	.4250	63.5	54.3	N.E.	13.9	3.5	10	0	88	....	....	....	29
30	67.60	75.8	57.8	18.0	29.8995	29.927	29.871	.056	.4718	70.7	57.2	N.E.	11.9	3.2	10	0	62	....	....	....	30
....Means	65.17	75.85	55.87	19.98	29.9152	.....	.....	.114	.4052	63.6	51.6	.....	15.0	5.86	..	..	58.4	1.75	....	1.75	Sums .....
17 yrs. means for & including this mo.	64.50	73.26	55.92	17.34	29.8991	.....	.....	.153	.4215	68.6	....	.....	....	5.71	..	..	55.5	3.08	....	....	17 years means for and including this month.

ANALYSIS OF WIND RECORD.

Direction.....	N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.	Calm
Miles	1953	1605	187	748	362	4697	892	358	
Duration in hrs ..	106	115	24	79	46	257	59	33	1
Mean velocity....	18.4	12.2	7.8	9.5	7.25	18.3	15.1	10.8	

Greatest mileage in one hour was 34 on the 26th.
Resultant mileage, 2760.
Resultant direction, S. 72.°5 W.
Total mileage, 10,801.

* Barometer readings reduced to sea-level and temperature of 32° Far.

§ Observed.

† Pressure of vapour in inches of mercury.

‡ Humidity relative, saturation being 100.

¶ Ten years only.

The greatest heat was 90.0 on the 16th; the greatest cold was 40.4 on the 3rd, giving a range of temperature of 49.6 degrees. Warmest day was the 15th. Coldest day was the 3rd. Highest barometer reading was 30.246 on the 5th; lowest barometer was 29.620 on the 1st, giving a range of 0.626 inches. Maximum relative humidity was 96 on the 22nd. Minimum relative humidity was 25 on the 7th.

Rain fell on 8 days.

Thunder storms on the 11th and 16th.

ABSTRACT FOR THE MONTH OF JULY, 1891.

Meteorological Observations McGill College Observatory, Montreal, Canada. Height above sea level, 187 feet. C. H. McLEOD, *Superintendent.*

DAY.	THERMOMETER. Mean.	Max.	Min.	Range.	*BAROMETER. Mean.	§ Max.	§ Min.	Range.	† Mean pressure of vapour	‡ Mean relative humidity.	Dew point.	WIND. General direction.	Mean velocity in miles perhour	SKY CLOUDED IN TENTHS. Mean.	Max.	Min.	Per cent. of Possible Sunshine.	Rainfall in inches.	Snowfall in inches.	Rain and snow melted.	DAY.
1	69.55	83.3	56.5	26.8	29.9600	29.989	29.919	.070	.5165	74.1	59.7	S.E.	12.0	5.8	10	0	78	0.13	....	0.13	1
2	64.70	68.0	61.3	6.7	29.9782	30.013	29.927	.086	.5623	92.0	62.3	S.	9.3	10.0	10	10	00	0.41	....	0.41	2
3	66.08	77.9	59.3	18.6	29.7963	29.928	29.712	.216	5280	83.8	60.5	S.	9.8	8.0	10	1	40	0.19	....	0.19	3
4	61.82	68.1	58.5	9.6	29.6163	29.702	29.568	.134	.4867	88.0	58.2	S.	10.0	10.0	10	10	03	0.55	....	0.55	4
SUNDAY.....5	.....	62.6	55.3	7.3	.....	....	.....	....	.....	....	.	S.	16.1	.. .	..	..	00	0.22	....	0.22	5	.....SUNDAY
6	57.53	64.8	51.5	13.3	29.7678	29.860	29.652	.208	.3552	75.0	49.5	S.W.	18.7	7.5	10	0	00	0.06	....	0.06	6
7	59.95	68.0	50.0	18.0	29.8402	29.906	29.767	.139	.3545	69.8	49.5	W.	13.5	6.5	10	0	82	0.10	....	0.10	7
8	60 95	70.8	51.0	19.8	29.8507	29.951	29.785	.196	.3970	74.7	52.7	W.	12.4	7.0	10	5	75	0.23	....	0.23	8
9	67.03	76.0	56.1	19.9	30.0778	30.109	30.041	.068	.3222	51.5	47.7	N.	11.3	1 2	3	0	100	....	....	....	9
10	70.50	80.6	55.6	25.0	30.1945	30.232	30.151	.081	.4075	55.2	53.3	S.W.	11.0	0.0	0	0	97	....	....	....	10
11	72.97	83.5	57.9	25.6	30.1523	30.230	30.074	.156	.4600	56.7	56.5	S.W.	14.6	0.5	2	0	96	....	....	....	11
SUNDAY 12	.....	83.0	64.8	18.2	.....	.....	. ....	....	.....	....	....	S.W.	18.0	....	..	..	74	....	....	....	12	.....SUNDAY
13	77.22	86.8	68.5	18.3	29.9407	30.028	29.877	.151	.5847	63.2	63 6	S.W.	20 0	3.7	10	0	80	....	....	....	13
14	75 42	85.6	69.7	15.9	29.8365	29 884	29.809	.075	.6305	72.5	65.5	S.W.	18.6	9.3	10	7	43	0.06	....	0.06	14
15	72.25	78.0	65.9	12.1	29.7345	29.804	29.676	.128	.5642	72.5	62.0	S.	17.7	7.8	10	2	39	0.14	....	0.14	15
16	66 77	73.0	62.3	10.7	29.8710	29.962	29.799	.163	.4720	72.0	57.3	S.W.	17.6	6.7	10	0	15	....	....	....	16
17	71.55	83.0	61.3	21.7	30 0130	30.046	29.986	.060	.5020	64.8	58.7	S.W.	12.0	0.3	2	0	97	....	....	.....	17
18	70.42	81.3	62.0	19.3	29.8643	30.017	29.694	.323	.4477	63.0	55.7	S.E.	14.8	8.2	10	3	34	0.25	....	0.25	18
SUNDAY.....19	.....	75.3	60.3	15.0	.. ....	.....	.....	....	.....	....	....	S.W.	14.6	....	..	..	60	0.34	....	0.34	19	.....SUNDAY
20	64.85	72.1	57.5	14.6	30.1225	30.171	30.038	.133	.3978	65.2	52.5	S.W.	11.5	7.8	10	3	37	....	....	....	20
21	64.83	74.4	55.4	19.0	30.2963	30.326	30.230	.096	.3482	57.5	49.0	N.	7.3	2.3	8	0	97	....	....	....	21
22	68.55	79.8	53.2	26.6	30.2575	30.357	30 143	.214	.3998	59.3	52.3	S.E.	7 9	3.5	10	0	76	....	....	....	22
23	69.17	74.0	65.3	8.7	30.0768	30.149	29.990	.159	.5730	80.5	63.0	S.	15.3	8.6	10	2	10	0.13	....	0 13	23
24	67.38	79.1	61.3	17 8	29.8835	29.976	29.810	.166	.5747	86.3	62.8	S.W.	10.2	9.0	10	4	35	0.50	....	0.50	22
25	61.05	68.0	57.0	11.0	29.8897	29.902	29.866	.036	.4032	74.5	53.0	N.W.	6.2	6.2	10	0	16	0.01	....	0.01	25
SUNDAY.....26	.....	67.6	54.5	13.1	.....	.....	.....	....	.....	....	....	S.W.	12.7	....	..	..	49	0.10	...	0.10	26
27	59 32	68.0	50.4	17.6	29.9117	29.956	29.886	.070	.3225	63.5	47.2	S.W.	9.8	4.8	9	0	94	....	....	....	27
28	62.85	72.8	52.5	20.3	29.8893	29.909	29.861	.048	.4110	71.2	53.3	S.W.	11.7	3.8	10	0	53	0.26	....	0.26	28	.....SUNDAY
29	67.17	72.8	56.0	16.8	29.9122	29.957	29.874	.083	.4745	72.8	57.5	S.E.	8.2	3.5	9	0	67	0.01	....	0.01	29
30	64.00	72.0	54.4	17.6	29.7855	29.870	29.702	.168	.4783	81.2	57.7	S.E.	16.8	8.6	10	0	18	1.10	....	1.10	30
31	57.00	70.0	45.6	24.4	29.8631	29.917	29.787	.130	.3390	73.5	48.1	S.W.	14.7	4.3	9	0	73	0.01	....	0.01	31
....Means	66.33	74.8	57.8	17.0	29.9401	....	.....	.131	.4564	70.9	55.9	S.34.° W.	13.0	5.71	..	..	52.9	4.80	....	4.80	Sums .....
17 yrs. means for & including this mo.	68.83	77.2	60.8	16.4	29.8874	.....	.....	.139	.4979	70.8	....	.....	....	5.46	..	.	¶58.5	4.19	....	4.19	17 yrs. means for and including this month

ANALYSIS OF WIND RECORD.

Direction.....	N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.
Miles.....	290	172	44	1103	2002	4672	1122	299
Duration in hrs ..	26	20	7	88	158	320	91	31
Mean velocity....	11.2	8.6	6.3	12.5	12.7	14.6	12.3	9.6

Greatest mileage in one hour was 28 on the 15th.
Greatest velocity in gusts 32 miles per hour on the 15th.
Resultant mileage, 6590.
Resultant direction, S. 34.° W.
Total mileage, 9704.

* Barometer readings reduced to sea-level and temperature of 32° Far.

§ Observed.

† Pressure of vapour in inches of mercury.

‡ Humidity relative, saturation being 100.

¶ 10 years only.

The greatest heat was 86.8 on the 13th; the greatest cold was 45.6 on the 31st, giving a range of temperature of 41.2 degrees. Warmest day was the 13th. Coldest day was the 31st. Highest barometer reading was 30.357 on the 22nd; lowest barometer was 29.5683 on the 4th, giving a range of 0.789 inches. Maximum relative humidity was 97 on 4 days. Minimum relative humidity was 33 on the 9th.

Rain fell on 20 days.

Thunder storms on six days, and lightning without thunder on two days.

ABSTRACT FOR THE MONTH OF AUGUST, 1891.

Meteorological Observations, McGill College Observatory, Montreal, Canada. Height above sea level, 187 feet. C. H. McLEOD, *Superintendent.*

DAY.	THERMOMETER. Mean.	Max.	Min.	Range.	* BAROMETER. Mean.	§ Max.	§ Min.	Range.	† Mean pressure of vapour	‡ Mean relative humidity.	Dew point.	WIND. General direction.	Mean velocity in miles per hour	SKY CLOUDED IN TENTHS. Mean.	Max.	Min.	Per cent. of Possible Sunshine.	Rainfall in inches.	Snowfall in inches.	Rain and snow melted.	DAY.
1	60.06	73.7	54.6	19.1	29.6653	29.760	29.568	.192	.3988	76.3	52.3	S.W.	18.6	6.7	10	0	33	0.03	....	0.03	1
SUNDAY.....2	.....	74.3	51.4	22.9	.....	.....	.....	....	.....	....	.	W.	16.8	....	..	..	94	....	....	....	2 .....SUNDAY
3	67.05	80.8	57.5	23.3	29.9760	30.045	29.907	.138	.3808	58.6	51.5	W.	8.4	3.0	8	0	96	....	....	....	3
4	66.50	82.5	55.5	27.0	30.1012	30.123	30.078	.045	.4368	69.3	55.0	S.E.	6.7	4.5	9	0	74	....	....	....	4
5	68.42	83.8	57.7	26.1	30.1095	30.155	30.074	.081	.4837	71.8	57.8	S.	5.3	1.0	3	0	83	...	....	....	5
6	72 48	82.7	57.2	25.5	30.0673	30.125	30.016	.109	.5155	65.2	59.7	S.W.	7.0	2.5	6	0	91	....	....	....	6
7	69.75	77.8	64.3	13.5	29.9500	29.993	29.904	.089	.5305	72.8	60.3	S.W.	16.3	6.5	10	0	58	....	....	.. ..	7
8	67.95	78.0	59.3	18.7	29.9692	30.016	29.941	.075	.4310	64.2	54.8	N.	7.3	1.8	8	0	94	....	....	....	8
SUNDAY 9	.....	78.1	58.5	19.6	.....	.....	. ....	....	.....	....	....	S.E.	9.5	..	..	..	17	...	....	....	9 ....: .....SUNDAY
10	75.95	84.1	68.2	15.9	29 8652	29.931	29.775	.156	.5640	63.7	62 2	S.W.	17.8	0.8	4	0	95	0.02	....	0.02	10
11	75 88	90.2	60 7	29 5	29.8473	29.957	29.750	.207	.5773	66.7	62.8	S.W.	14 1	3.3	10	0	77	0.11	....	0.11	11
12	70.62	77.2	64.2	13.0	29.8105	29.898	29.748	.150	.5897	78.5	63.3	S.W.	13.7	8.3	10	1	19	0.04	....	0.04	12
13	65.50	74.8	57.4	17.4	29.9852	30 018	29.946	.072	.3067	64.8	52 3	N.	6.8	3.8	10	0	90	0.04	..	0.04	13
14	65.27	73.8	56.4	17.4	30 0175	30.046	30.001	.045	.4667	76.2	57.2	S.W.	5.2	7.0	10	2	78	0.13	....	0.13	14
15	65 00	70.0	59.9	10.1	29.9853	30.020	29.956	.064	.5110	83.3	59.7	E.	5.5	6.7	10	0	13	0.04	....	0.04	15
SUNDAY. 16	.....	76.5	59.0	17.5	.. ....	.....	.....	....	.....	....	....	S.W.	3.0	....	..	..	42	....	....	....	16 .....SUNDAY
17	69.93	78.8	60.8	18.0	29.9773	30.053	29 910	.043	.4720	65.3	57.5	S.W.	10 0	2.5	5	0	97	....	....	....	17
18	66.22	74 5	62.1	12.4	29.8665	29.944	29.814	.130	.5082	78.7	58.7	S.W.	8.7	7.3	10	0	40	1.03	....	1.03	18
19	60.23	67.4	53.6	13 8	30.0277	30 079	30.005	.074	.3313	64.5	47.7	N.E.	11.1	2.5	10	0	98	....	....	....	19
20	68 17	81.6	50 6	31.0	29.8145	29.980	29.649	.331	.4975	72 7	58.5	S.	11.7	1.3	3	0	92	....	....	....	20
21	69.02	72.4	68.3	4.1	29.5330	29.615	29.469	.146	.6302	86.8	65.3	S.	13.8	10.0	10	10	00	1.20	....	1 20	21
22	70.58	78.0	61.0	17.0	29.7530	29.873	29.644	.229	5023	66.7	58.5	S.W.	11.2	4.2	10	0	75	....	....	....	22
SUNDAY.....23	.....	71.9	58.2	13.7	.....	.....	.....	...	.....	. ..	....	N.	18.3	....	..	..	02	0.04	....	0.04	23 ..... .SUNDAY
24	59.52	64.0	56.7	7.3	29.8945	29.935	29.845	.090	.4840	95.0	58.0	N.E.	14.5	10.0	10	10	01	0 74	....	0.74	24
25	65.45	71.5	58.5	13.0	30.0820	30.224	29.915	.309	.4192	66.2	53.5	S.W.	19.9	4.3	10	0	81	0 26	....	0.26	25
26	64.32	73.8	53.2	20.6	30.2010	30.283	30.141	.142	.4177	69.8	53.8	S.W.	6.6	5.5	9	0	82	....	...	....	26
27	65 03	73.4	58.0	15.4	30.0112	30.118	29.902	.216	.5388	80.0	61.3	S.E.	3.8	7.0	10	0	21	0.02	....	0.02	27
28	65.62	74.2	58.3	15.9	29.7782	29.825	29.737	.088	.4817	75 7	57.0	S.W.	17.1	9.8	10	9	27	....	....	....	28
29	57.55	65.3	50.6	14.7	30.0232	30.158	29.879	.279	.3317	70.7	47.7	S.W.	17.0	6.7	10	0	59	....	....	.. .	29
SUNDAY..... 30	.....	69.5	50 6	18.9	.....	.....	.....	....	.....	....	....	E.	5.9	....	..	..	60	....	....	....	30 ....SUNDAY
31	60.23	63.7	57.8	5.9	30.1878	30.208	30.172	.036	.4427	85.2	55.5	E.	4.5	10.0	10	10	22	0.00	....	0.00	31
....Means	66.65	75.4	58.3	17.4	29.9422	.....	.....	.136	.4750	73.0	57 0	S. 44½° W.	10.8	5-3	..	..	¶58.4	3.70	....	3.70	Sums .....
17 yrs. means for & including this mo.	66.94	75.2	58.8	16.4	29.9410	.....	.....	.133	.4809	72.4	....	....	....	5 3	..	.	59.9	3.19	....	3.19	17 yrs. means for and including this month

ANALYSIS OF WIND RECORD.

Direction.....	N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.
Miles.....	761	868	305	381	1176	3448	905	223
Duration in hrs ..	79	68	60	56	110	255	78	21
Mean velocity....	9.6	12.8	5.1	6.8	10.7	13.5	11.6	10.6

Greatest mileage in one hour was 32 on the 28th.
Greatest velocity in gusts 36 miles er hour on the 25th.
Resultant mileage, 3401.
Resultant direction, S. 44° 30′ W.
Total mileage, 8067.

* Barometer readings reduced to sea-level and temperature of 32° Far.

§ Observed.

† Pressure of vapour in inches of mercury.

‡ Humidity relative, saturation being 100.

¶ 10 years only.

The greatest heat was 90.2 on the 11th; the greatest cold was 50.6 on the 20th, 29th and 30th, giving a range of temp. of 39.6 degrees. Warmest day was the 10th. Coldest day was the 29th. Highest barometer reading was 30.283 on the 26th; lowest barometer was 29.469 on the 21st, giving a range of 0.814 inches. Maximum relative humidity was 98 on the 24th. Minimum relative humidity was 39 on the 11th.

Rain fell on 14 days.

ABSTRACT FOR THE MONTH SEPTEMBER, 1891.

Meteorological Observations, McGill College Observatory, Montreal, Canada. Height above sea level, 187 feet. C. H. McLEOD, *Superintendent.*

DAY.	THERMOMETER.				* BAROMETER.				† Mean pressure of vapour	‡ Mean relative humidity.	Dew point.	WIND.		SKY CLOUDED IN TENTHS.			Per cent. of Possible Sunshine.	Rainfall in inches.	Snowfall in inches.	Rain and snow melted.	DAY.
	Mean.	Max.	Min.	Range.	Mean.	§ Max.	§ Min.	Range.				General direction.	Mean velocity in miles per hour	Mean.	Max.	Min.					
1	61.82	69.7	56.9	12.8	30.1098	30.180	30.056	.124	.4730	85.8	57.5	E.	3.1	7.0	10	0	19	0.18	....	0.18	1
2	62.43	72.7	54.0	18.7	30.0643	30.110	30.023	.087	.4670	83.8	57.2	W.	7.7	3.7	10	0	64	....	....	....	2
3	69.25	79.1	59.2	19.9	29.9922	30.053	29.932	.121	.5068	72.0	59.5	S.E.	14.0	2.3	9	0	83	....	....	....	3
4	63.35	70.5	52.7	17.8	30.0920	30.287	29.932	.355	.4730	80.2	56.5	W.	13.9	7.0	10	0	37	0.21	....	0.21	4
5	55.77	62.1	47.4	14.7	30.2502	30.338	30.142	.196	3613	80.8	49.7	N.	9.7	8.8	10	5	16	0.22	....	0.22	5
SUNDAY.....6	.....	74.3	57.6	16.7	.....	.....	.....	....	.....	....	....	S.E.	14.2	....	..	..	32	0.09	....	0.09	6 .....SUNDAY
7	60.82	68.5	56.8	11.7	29.8877	29.955	29.819	.136	.4147	78.3	53.8	W.	10.9	8.0	10	3	61	....	....	....	7
8	55.48	62.0	51.6	10.4	30.0803	30.159	29.999	.160	.2987	69.3	44.8	N.W.	9.6	4.7	10	0	79	....	....	....	8
9	58.10	67.2	48.1	19.1	30.1565	30.206	30.092	.114	.3415	70.8	48.2	W.	12.5	7.0	10	3	53	Inap.	....	Inap.	9
10	63.07	71.5	56.5	15.0	30.2840	30.306	30.253	.053	.4023	69.8	54.2	W.	16.6	2.0	8	0	84	0.01	....	0.01	10
11	64.13	73.1	57.2	15.9	30.2623	30.319	30.212	.107	.4312	73.2	54.7	S.W.	14.2	5.8	10	0	75	....	....	....	11
12	64.83	75.6	55.0	20.6	30.0868	30.207	29.952	.255	.4263	70.7	54.7	S.E.	10.0	0.7	2	0	86	....	....	....	12
SUNDAY 13	.....	71.5	59.1	12.4	.....	.....	.....	....	.....	....	....	W.	12.8	....	..	..	32	0.01	....	0.01	13 .....SUNDAY
14	55.53	61.6	46.7	14.9	29.8913	29.988	29.796	.192	.3297	73.7	47.3	W.	11.2	8.3	10	0	08	....	....	....	14
15	51.40	58.9	43.1	15.8	29.9838	30.033	29.921	.112	.2708	71.7	42.5	N.W.	3.6	5.0	10	0	64	Inap.	....	Inap.	15
16	55.78	65.4	46.0	19.4	30.1548	30.235	30.037	.198	.3198	72.2	46.7	W.	8.6	3.7	10	0	89	Inap.	....	Inap.	16
17	61.40	71.7	51.4	20.3	30.1708	30.285	30.042	.243	.4262	78.8	54.2	S.	6.1	6.3	10	2	41	Inap.	....	Inap.	17
18	69.23	82.0	62.7	19.3	29.8807	29.989	29 765	.224	.5588	77.5	61.8	S.W.	24.6	6.3	10	0	52	0.11	....	0.11	18
19	59.80	66.8	51.4	15.4	39.1842	3 216	30.097	.119	.3273	64.0	47.2	N.	9.8	0.2	1	c	97	....	....	....	19
SUNDAY.....20	.....	70.5	48.4	22.1	.. ....	.....	.....	....	.....	....	....	S.W.	9.3	....	..	..	94	....	....	....	20 .....SUNDAY
21	63.35	74.8	54.0	20.8	30.0687	30.168	30.017	.151	.4550	78.0	56.2	S.	10.3	7.8	10	4	54	Inap.	....	Inap.	21
22	60.42	68.4	51.1	17.3	30.1190	30.207	30.048	.159	.4712	88.8	57.0	N.E.	9.1	5.0	10	0	45	....	....	....	22
23	68.32	74.8	64.2	10.6	30.0497	30.084	29.964	.120	.5693	82.5	62.5	N.E.	5.8	5.7	10	0	56	....	....	....	23
24	70.73	80.7	58.4	22.3	30.0403	30.096	29.994	.102	.5803	78.5	63.2	N.W.	16.2	0.7	2	0	83	....	....	....	24
25	74.65	83.5	68.1	15.4	29.9173	29.999	29.815	.174	.5853	69.0	63.3	S.W.	29.0	0.5	2	0	89	Inap.	....	Inap.	25
26	64.12	71.3	59.2	12.1	30.1653	30.196	30.095	.101	.4107	69.5	53.3	N.	6.4	2.0	10	0	94	....	...	....	26
SUNDAY.....27	.....	74.6	52.0	22.6	.....	.....	.....	....	.....	....	....	S.	4.3	....	..	..	85	....	....	....	27 ..... SUNDAY
28	70.33	81.1	60.9	20.2	30.0845	30.166	29.998	.168	.5803	79.0	63.0	S.	8.5	1.7	10	0	76	....	....	....	28
29	64.58	75.1	53.5	21.6	29.8937	30.065	29.732	.333	.4302	67.8	53.3	S.W.	23.5	3.3	10	0	37	0.20	....	0.20	29
30	50.83	58.7	42.5	16.2	30.3907	30.473	30.237	.236	.2308	62.2	38.2	N.W.	12.9	1.2	4	0	96	....	....	.. .	30
31	.....	....	.....	....	.....	.....	.....	....	.....	....	....	.....	....	....	..	..	..	....	....	....	31
....Means	62.29	71.26	54.14	17.12	30.0870	.....	.....	.167	.4285	74.9	53.9	W. 19° S.	11.6	4.4	8.4	0.7	62.7	1.03	....	1.03	Sums .....
Years means for & including this mo.	58.73	66.74	50.97	15.78	30.0155	.....	.....	.178	.3836	75.1	....	.....	....	6.4	..	.	¶54.94	3.21	....	3.21	Years means for and including this month.

ANALYSIS OF WIND RECORD.

Direction.....	N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.	Calm.
Miles	663	329	39	837	819	2036	2793	853	
Duration in hrs ..	65	32	14	70	87	128	217	90	17
Mean velocity....	10.2	10.3	2.8	12.0	9.4	15.9	12.9	9.5	

Greatest mileage in one hour was on the th.
Greatest velocity in gusts at miles er hour on the th.
Resultant mileage, 4175.
Resultant direction, W. 19° S.
Total mileage, 8369.

* Barometer readings reduced to sea-level and temperature of 32° Far.
§ Observed.
† Pressure of vapour in inches of mercury.
‡ Humidity relative, saturation being 100.
¶ 10 years only.

The greatest heat was 83.5 on the 25th; the greatest cold was 42.5 on the 30th, giving a range of temp. of 41.0 degrees. Warmest day was the Coldest day was the Highest barometer reading was 30.473 on the 30th; lowest barometer was 29.732 on the 29th, giving a range of 0.741 inches. Maximum relative humidity was on the . Minimum relative humidity was on the

Rain fell on 14 days.
Snow fell on days.
Rain or Snow fell on 14 days.
Auroras were observed on 3 nights.
Hour frost on days.
Lunar hals on 2 nights.
Lunar corona on the
Fog on 5 days.