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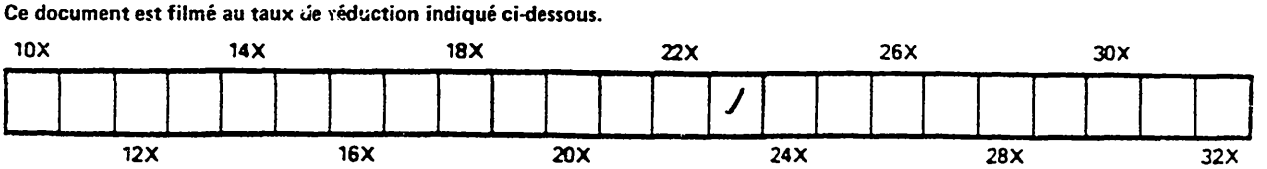

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NOTES ON THE GEOLOGICAL RELATIONS AND MODE OF OCCURRENCE OF SOME OF THE MORE IMPORTANT ECONOMIC MINERALS OF EASTERN QUEBEC.

R. W. ELLS, LL.D., F.G.S.A.

That part of the Province of Quebec situated to the south and east of the River St. Lawrence, in which is included the portion more particularly styled the Eastern Townships, may be briefly stated to have a length of about 470 miles from the boundary of the State of Vermont to the extremity of Gaspé, with a breadth of from 100 to 120 miles between Montreal and the boundaries of Maine and New Hampshire. This breadth, however, gradually decreases northward until a short distance below Quebec it becomes less than thirty miles. Beyond this it assumes greater proportions, and in the peninsula of Gaspé itself, which projects like a huge finger into the Gulf of St. Lawrence, the distance from shore to shore is not less than seventy to seventy-five miles.

Through the interior of this area, and in most cases not far from its central line, a belt of hilly country, with elevations reaching in places a height of 3,500 to 4,000 feet above the sea, extends, with a few interruptions, throughout the entire distance. These hills are known under various names, as the Sutton Mountain Range to the south-west, the Stoke Mountains near Sherbrooke, the Buckland Hills north of the Chaudière River, and the Notre-Dame Range which has a considerable extent in Gaspé and is there further distinguished by the title of the Shick-Shocks. To the south-west, in Vermont, the continuation of these hills is known as the Green Mountains, the extension of which, under different names, can be traced nearly to the Gulf of Mexico.

The fertility of much of the country throughout this portion of the Province is well known. Underlaid to a great extent by a broad area of slaty rocks, with which is associated a considerable development of limestone, their decay has produced a soil of great value to the husbandman; so that what is known as the "Eastern Townships" has long enjoyed a most enviable reputation both for farming and dairying operations, and here are found some of the most celebrated farms and stock centres of Canada. The eastern or Gaspé section has, on the other hand, remained comparatively unknown; the general impression being

that its surface and climatal conditions were unfavorable to the labors of the husbandman. While, to a certain extent, this may be true of certain portions, large areas exist there which, underlaid by the calcareous slates and limestones of the Silurian and Devonian systems, possess a soil almost precisely similar to that on which the most prosperous settlements of western New Brunswick are situated, as seen in the counties of Carleton and Victoria; while through the interior of the peninsula extends a broad area, having no great elevation above the sea, bounded on either hand by lofty ranges, and which, but for its present comparative inaccessibility, would doubtless have long since been brought into prominence as a desirable country for the farmer or the stock-raiser. In this broad valley, which extends from the Metapedia River to the Gaspé Basin, most of the larger streams of the peninsula take their rise. On the hill slopes great quantities of valuable timber, spruce, pine and cedar, are found, while the upper portions of the rivers flow through extensive hay swamps, and the conditions are such, apparently, as to greatly favor the successful development of this section so soon as easy means of access are provided. At the present time the population is confined entirely to a narrow strip on either shore, but more particularly to the south side or that bordering on the Bay des Chaleurs, where the value of the rich soils of the Lower Carboniferous formation has long been known.

More than forty years ago, Logan and Murray explored many of the streams of the Gaspé district and scaled the rugged peaks of the Shick-Shock range, not only for the purpose of studying their structure, but in order to effectively carry out a system of triangulation by which the prominent hill features of this almost inaccessible portion could be accurately mapped. Since then others have traversed the country in nearly every available direction, and have outlined its physical and geological structure with much care. It is, however, in that portion of the Province lying to the south and east of the St. Lawrence, between Quebec and the American boundary, that by far the greatest amount of detailed geological work has been done, and here, as everyone familiar with the history of Canadian geology knows, some of the most interesting and difficult problems peculiar to the science are presented, the complete working out of which has not yet been accomplished. Here the

complicated structure of the rock masses which compose the mountain ranges, and the faulted, crumpled and widely different character of much of the strata on either side have given rise to a great diversity of opinion regarding their true position in the geological scale. In Canada these problems have been discussed mostly under the head of the Quebec group, while in the adjoining States the fight has been carried on under the name of the Taconic controversy.

The earliest expressed views of Sir Wm. Logan, in 1847, assumed that the age of the mountain ridges of the Eastern Townships was probably that of the Hudson River division of the New York geologists. Although the rocks were for the most part in a highly crystalline condition, they were supposed to be the metamorphic equivalents of the comparatively unaltered and frequently highly fossiliferous sediments which occupied the greater part of the country between their slopes and the St. Lawrence. All traces of these fossils were held to be eliminated by the process of metamorphism to which the strata had been subjected, and by which, also, the shales and sandstones were converted into highly crystalline schists and chlorite rocks.

This view as to the metamorphism of the fossiliferous strata of the south side of the river was maintained by most workers in this field for nearly twenty-five years, although the opinion formerly expressed as to the Hudson River age had been modified in 1860 by Sir Wm. Logan, owing to the discovery of a great series of fossils in the rocks about Point Lévis and at other points which clearly indicated that their true position was at the bottom of the Cambro-Silurian system rather than at the top as had so long been supposed. As early, however, as 1862, Mr. Thomas Macfarlane compared the crystalline schists and associated rocks of the Eastern Townships with the upper part of the primitive schist formation of Norway, and also with the copper-bearing series of Lake Superior. The resemblance of the two series was also pointed out by Sir Wm. Logan, in the Geology of Canada, 1863. The Huronian aspect and probable age of these crystalline rocks was first recognized and publicly stated by Dr. Hunt, in 1871, and later, in 1877, by Dr. Selwyn, while in the late report on this portion of Quebec by the writer, 1886, these rocks are described under the general term Pre-Cambrian, by which is meant that they constitute a group unconformably beneath

what are regarded as the Lower Cambrian quartzites and slates of that area.

Briefly speaking, the structure of the metamorphic rocks of south-eastern Quebec may be said to consist of a series of approximately parallel ridges or anticlinals of Pre-Cambrian age, of which at least three have been definitely located. The most easterly of these is found along the boundary between Maine and the eastern limit of the Province, the middle is seen in the Stoke Mountain range and its expansion south-westerly to Lake Memphremagog, while the third constitutes the Sutton Mountain range and its prolongation to the north-east through the Province to Gaspé.

The intervals between these ranges are occupied by overlying sediments, mostly sandstones and slates of various colors, which, in places, are fossiliferous, and are now regarded and described in the Geological Report for 1886 as of Cambrian and Cambro-Silurian age. With these are associated areas, often of large size, of diorites, serpentines and granitic rocks. At several points, also, small, isolated and, at times, closely infolded basins of fossiliferous Silurian strata are observed. Between the most westerly of the old ridges and the St. Lawrence River the country is apparently occupied to a very large extent by rocks of Cambro-Silurian and Upper Cambrian age, much of which constitute what has for many years been regarded as the unaltered portion of the Quebec group, while the newer portion or that nearest the river is characterized, throughout a large extent, by fossils of the Hudson River and Utica formations.

The mineral wealth of this portion of Quebec is confined, for the most part, to the older systems, viz., the Pre-Cambrian and Cambrian, and though traces of various ores are occasionally found in the newer, in no case yet observed do these occur in quantity sufficient to be of economic value. Thus the workable deposits of *copper* ore exist principally in the Pre-Cambrian schists, though they have been located and worked, to a limited extent, in rocks of the overlying system. The ores of *iron* are found also mostly in the lowest series, and when found in the upper are largely confined to the volcanic portion, sometimes in the serpentines where veins often of large size occur. The *gold*, which, however, has not as yet been worked except as an alluvial deposit, pre-

sumably comes, to a very large extent at least, from quartz veins in the Cambrian slates and quartzites, though it may also occur in limited quantity in the Cambro-Silurian, and has been detected in metalliferous lodes in the older crystalline schists. The *asbestus* is almost entirely confined to the serpentines of the volcanic portion of what has been styled the Lower Cambrian, and which occurs probably as an alterative product from dioritic rocks, rich in olivine. The serpentine is generally associated with slates and hard sandstones of that system. The *chromic iron* is also confined to this belt of rocks. The *silver ores*, which, in places, carry a fair percentage of gold, apparently belong to the same horizon as the auriferous quartz veins, though small deposits of argentiferous galena are found with rocks of the upper part of the Silurian system in Gaspé; while the ores of antimony occur in a series of slaty and micaceous schists which are either low down in the Cambrian or lie near the summit of the underlying system.

The sources of mineral wealth more especially prominent at the present time in Eastern Quebec, and about which the greatest amount of interest is centred, are three in number, viz, copper, asbestus and gold, and as these bid fair to increase annually in importance, a brief glance at their history and geological relations may be of interest.

The first official reports on the copper deposits of the Eastern Townships by the Canadian Geological Survey were made by the late Sir W. E. Logan, in 1847, when attention was directed by him to the occurrence in the townships of Ascot, Upton and Inverness of that mineral, which places were recommended by him as localities for trial. Explorations proceeded rapidly and resulted in the location of numerous mines at various points, principally in what was then regarded as the metamorphic portion of the series, subsequently styled the Quebec group, and more especially in what was afterward regarded as the middle and upper divisions of that group, viz., the Lauzon and Sillery formations. These rocks were at that time supposed to be arranged in a series of generally parallel synclinals, extending north-east and south-west. In the first or more westerly of these were placed the copper areas of Roxton, Upton and Acton; in the second, those of Durham, Tingwick, Inverness, Chester, Halifax and Leeds; while the third, together with what was regarded as the double synclinal of Sutton

Mountain, included, in addition to rocks somewhat similar to those of the other two, great masses of serpentine, potstone and soapstone, and was seen in Bolton, Brompton and Broughton. The extensive deposits of Acton were supposed to belong to the upper or Sillery division.

Of the many copper mines which were started some twenty-five years ago, or when the copper boom was at its highest, very few are at present in operation. Of many of those which long since suspended operation, several causes for their discontinuance may be assigned. In some cases their failure was doubtless largely caused by a lack of size in the mineral veins; in others this was due presumably to the poverty or leanness of the ore as well, a conjunction which, taken in connection with the depressed condition of the copper market, rendered the profitable extraction of the mineral impossible. The difficulty of producing metallic copper under such adverse conditions was such that, although extensive smelting works had been erected at large expense at several points, these had of necessity to be abandoned, and have rapidly fallen into decay. The ores from the great lodes of Capelton have for years been shipped direct from the mines to the extensive acid works near New York, where they were treated directly for the manufacture of sulphuric acid, the residue being subsequently utilized for the extraction of the metallic copper, and in this way, owing to the great extent of the deposit and the facilities for mining and shipment, the mines at this place have continued to be worked at a profit. Within the last two years, sulphuric acid works have been started on the spot, by which means the expense of transferring so great a bulk of raw material can be avoided. Could this new industry be combined with that of the production of phosphate from the Ottawa valley, and the manufacture of artificial fertilizers established on the larger scale, still further benefit should accrue; since undoubtedly, in view of the present greatly impoverished condition of much of the wheat-producing lands of Ontario and Quebec, the use of these fertilizers must of necessity shortly become very considerable, or the profitable raising of wheat in these countries must become a thing of the past. In character, the copper ores of the townships may be classed under three heads, viz., the yellow sulphuret or chalcopyrite, with which is very frequently found a large percentage of iron pyrites; the vitreous or copper glance; and the variegated, other-

wise known by the names of purple copper, erubescite and peacock or horse-flesh ore. The deposits of the first have their greatest development in Bolton, Hatley and Ascot, the associated rocks being for the most part chloritic slates, dioritic rocks and sometimes serpentines. The important mines of this area are those south of the city of Sherbrooke, at Capelton, and the Huntington mine, in Bolton. The other varieties are more frequently found in the most westerly belt of cupriferous schists, as seen in the townships of Acton, Halifax, Leeds, etc., where they are generally associated with dolomitic limestones and nacreous or micaceous schists. Among the most celebrated mines of this area may be mentioned those of Acton and Harvey Hill, at both of which localities very extensive workings were carried on for many years.

The occurrence of copper lodes of such size as are found at several points, notably in that portion of Ascot, south of the city of Sherbrooke is probably, to some extent, due to the presence of dioritic dykes and masses, often of large extent, which penetrate the cupriferous schists of that area. This feature is also seen at several other points in connection with the deposits of Sutton, Bolton and Brompton, though, at times, the diorite has changed its character and passed into a more or less pure serpentine, the two kinds of rocks being frequently intimately associated.

The *asbestus* industry, which from its inception has steadily but rapidly increased in importance, bids fair to shortly become one of the leading mining industries of the Province. While the occurrence of this mineral has been known for many years and has been referred to in several of the early reports of the Geological Survey, its real economic value was apparently undiscovered till within a comparatively recent period. Although occurring to some extent with the serpentines which are associated with the limestones of the Laurentian district north of the River Ottawa, the development in this direction has not yet been sufficiently studied to warrant a clear expression as to the actual value of the deposits in this quarter, and the economic production of this mineral is as yet entirely confined in Canada, or at least in Quebec, to the belt of serpentine rocks which have been mentioned as forming a part of the volcanic belt of the Lower Cambrian of that Province.

The stratified rocks associated with the serpentines are black, green, grey and purple slates, with, occasionally, conglomerates, and sometimes beds of hard quartzose sandstone. The diorites, with which they are intimately associated, frequently form great mountain masses, as at Orford, Ham, Thetford, etc., and in texture are both massive and concretionary, while in color they range from shades of green to brown.

The serpentines are in places penetrated by dykes and sometimes considerable areas of a hard, whitish granite or granulite, often composed entirely of quartz and orthoclase felspar, but at times containing an admixture of mica. Whatever may be the age of these granite dykes, they certainly are newer than the rock with which they are now associated, since they are frequently seen to cut directly across the serpentines and to produce an alteration in the mass at the contact; and the view is held by many of those engaged in mining asbestus that the influence of the dykes upon the serpentine which they penetrate is apparently the same in regard to the favorable production of asbestus veins as the presence of diorite dykes on copper or other mineral-bearing strata in the production of metalliferous lodes.

In Quebec the serpentine extends for many miles, and is found at intervals from the Vermont boundary almost to the extremity of Gaspé, the most easterly outcrop in this direction being what is known as Mount Serpentine, on the Dartmouth River, about eleven miles from its outlet into Gaspé Basin. It presents a very large development in the Shick-Shock Mountains, where, at the south west extremity, a spur from the main mass cuts strata of hard dolomitic limestone and conglomerate in a dyke-like mass of 150 feet in width. Further west, though outcrops may exist in the great belt of comparatively unknown lands in rear of River Du Loup and Rimouski, its presence is not yet known in this direction till we reach the road leading south from St. Thomas to the boundary of Maine, about forty-four miles east of the Chaudière River. There several small knolls are found which apparently mark the eastern termination of the Cambrian volcanic belt. Further west, the serpentine occurs in limited areas with the dioritic masses of Cranbourne and Ware, and in several small outcrops on the Chaudière between St. Joseph and St. Francis; but in the Townships

of Thetford, Coleraine, Wolfestown and Ham a sudden and marked development is noticed, the rock forming great mountain masses, as seen about Black Lake and in Wolfe. Isolated areas are also found in the St. Francis River basin at Brompton, Melbourne and near Danville, but at no place is there such a great development visible as in Coleraine and Thetford. Other small areas, constituting part of the second or Stoke Mountain anticlinal, exist in the vicinity of Massawippi Lake, in Hatley, while the areas of Oxford and Bolton have already been indirectly referred to. While traces of asbestus are found at nearly every one of these localities, in many places the indications of it observed are insignificant, though over large areas, it must be confessed, the examinations yet made have been but cursory, and these may yet yield this peculiar and valuable mineral in abundance. It is, however, apparent that all serpentine is not equally rich in asbestus, for even in the most productive areas great differences in this respect are visible, and large portions of the belt are made up of what is called barren rock. As a general rule, the different kinds of serpentine, whether likely to be productive or not, can be determined by outward characters, either by peculiarities of weathering or by the texture and color of the mass of the rock itself. At Thetford and in the northern part of Coleraine, more particularly about Black Lake, certain peculiar conditions appear to have prevailed which have affected the great serpentine masses there, and led to the formation in large quantity of the mineralized form of asbestus, the veins here being not only very numerous, often interlacing the rock in all directions, but being also of large size, reaching a width at times of over six inches, while many of them range from two to four inches. In quality of fibre also a marked difference from that found at several other points is apparent by its greater softness and silkiness, which give it a special value for the many purposes of manufacture for which it is most in demand.

In its mode of occurrence asbestus appears to follow closely the principles which are known to affect metalliferous lodes in general. The veins have the aspect of segregation veins, the fibres in all cases, unless disturbed, being at right angles to the sides of the fissure, and in many cases, more especially in those of larger size, the fibre is broken near the centre by particles or grains of magnetic or chromic iron

which at times form small partings, affecting to some extent the value of the material. The containing rock shows the presence of numerous faults, as in other mineral localities, which throw the veins from side to side, and at times completely cut off the entire working face of the mine. The sides of the fissure are in such cases extensively slickensided, and often have streaks of coarse, woody-fibred or imperfect asbestus along the planes of fracture. The growing importance of this industry may be seen from the fact that the output of the mineral has increased from 50 tons in 1878 to over 4,500 tons in 1888, while the demand and value are rapidly improving.

Apparently confined almost exclusively to the same group of Cambrian rocks are the gold deposits of Eastern Quebec. First discovered in 1835 on the Chaudière River and its tributaries, this industry for a long time almost entirely appertained to this locality, though a second and possibly quite as important gold field has been worked to some extent for the last fifteen or twenty years in the extreme south-easterly part of the Province, in the Township of Ditton. The rocks which constitute not only those which we now regard as the original source of the gold of this section, but the overlying Cambro-Silurian slates and limestones as well, were for many years regarded as of Upper Silurian age, although their resemblance to the Cambrian gold-bearing series of Nova Scotia had been pointed out long since by Sir Wm. Logan, Dr. Selwyn, Dr. Hunt and others; and the only reason apparent why these rocks were allowed for so many years to remain in the Silurian system was that the great importance of the geological problems pertaining to the structure of the metamorphic portion withdrew attention almost entirely from this area.

The Silurian age of these sediments was first of all inferred by the officers of the Geological Survey from their supposed resemblance to the rocks of that system which had been studied in Gaspé, and it was supposed that these formed the western prolongation of the Gaspé limestone series. The presence, also, of areas of fossiliferous Silurian and Devonian strata at various points, which were in places so intimately associated with the rocks of the great eastern basin as at first sight to appear to form an integral portion of the series, supported this first view as to their apparent horizon. In the subsequent detailed study of the country

many of the masses of black slate and limestone were found to be fossiliferous, but the determination of their organic remains showed that these clearly belonged to a lower system and that they were in fact of the same horizon as the limestones and slates of Richmond and vicinity, whose Cambro-Silurian age had been determined some years before, while the stratigraphical working out of the district proved that these rocks were clearly superimposed upon the quartzites and slates of the Chaudière gold series and upon a similar set of rocks which extended along the border of Maine and New Hampshire.

Although for a long time after the first discovery of the gold in the Chaudière district its source was unknown, a series of investigations and assays, conducted by Dr. Hunt and Mr. Michel and published in 1866, clearly proved the auriferous character of many of the quartz veins of this district. Subsequent investigations have shown that the principle now recognized in the gold fields of Nova Scotia, viz., that the rich gold leads are for the most part confined to the vicinity of the anticlinals, in all probability applies to the similar rocks of Quebec; since at Ditton, where rich alluvial workings also exist, the gold is generally found in the greatest quantity in close proximity to the anticlinal areas which are there well defined. On the Chaudière the same principle will doubtless be found to apply, though here probably some of the anticlinals are overturned and their location will in consequence be more difficult.

The establishing of the horizon of these gold-bearing slates and quartzites as the equivalent of those so long worked in Nova Scotia is very important, since it should tend to make more simple the location of future operations in this direction. In the area occupied by these rocks most of the coarse gold yet found has been obtained in close proximity to well defined quartz leads, and much of it has without doubt been derived from the decomposition of these veins, some of which can be traced for a considerable distance; while over the great area of the overlying Cambro-Silurian sediments of the eastern basin, though gold is found at a number of points, and in fact can be washed from the gravels of nearly every stream, this gold is always fine in character, and its distribution is apparently due either to glacial action or to the conditions that succeeded that period, by which the sands and gravels

which are found over a large portion of this district were laid down. It is also probable that the frequent intrusions of dioritic rocks, seen both on the Chaudière, where the richest workings are situated, and at points through the Ditton area, have had some influence in determining the presence of gold in quantity in these districts, since there are considerable areas of Cambrian strata in this section from which but little, if any, gold has yet been reported.

The presence of old pre-glacial channels in many of the streams flowing into the Chaudière from either side has of late years been clearly established, and their lower portions have, in most cases where excavated, been found to contain much gold, both fine and coarse. These channels are often of considerable depth, and are filled with sand and gravel, the boulder clay being found at the top or near the present surface of the country. In the washings of the lower auriferous gravels much black sand is obtained. Although but few of these channels have been fully tested, the great richness of those of the Gilbert stream, and at several other points in the vicinity, testify to the great importance of this feature in the interests of the gold production of this area. No examinations for gold, of any scientific value, have yet been made in that portion of the Gaspé Peninsula occupied by rocks of Pre-Cambrian and Cambrian age, though reports of its presence along the flanks of the Shick Shock range have been current for years. The comparative inaccessibility of much of this country has hitherto deterred explorers from making a thorough trial of this section, though there are many points that should receive careful investigation both from the prospects of finding a new gold field and from the possible occurrence of asbestus and chromic iron in workable quantity in some part of the great serpentine areas about the heads of the Ste. Anne and Cascapedia Rivers. The presence of the latter mineral was reported from this locality many years ago.

The presence of gold in connection with the veins of rich argentiferous galena found on the upper waters of the Du Loup, a branch of the Chaudière River, in the Townships of Risborough and Marlow, is also of interest in this connection. The percentage of silver from these veins, varying from $25 to over $400 per ton, is such as to make this locality one of considerable economic importance, and further attention

will doubtless be directed to these upon their being made easily accessible by the present projected line of railway, which it is anticipated will cross this section. At this place also the richest ore by assay is found in close proximity to a dioritic dyke of considerable magnitude.

An attempt was made some half dozen years ago to extract the gold from the banks of clay, sand and gravel along the Du Loup, a tributary from the east of the Chaudière, by the hydraulic method. Owing to various unfavorable circumstances this enterprise does not appear to have been remunerative. The failure in this case should not, however, be regarded as conclusive, as determining the unprofitableness of such an enterprise, either on this stream or the many others in this locality, since from a series of trial washings over considerable areas made in 1851-52 under the supervision of an officer of the Geological Survey the results obtained from the Du Loup district were such as to fully warrant the employment of this method for the separation of the gold on a large scale. The occurrence of nuggets of large size, some of which had a value of over $1,000, from the auriferous gravels of this district is a very important feature, since such coarse gold has not in all probability travelled any considerable distance from its source. Comparing the very low percentage of gold which is profitably extracted from the gravels of California and Australia by this method with the yield obtained in the experimental trials just referred to in the Chaudière district, there should, for that section, be a very handsome margin for profit over expenditure, provided the topographical features of these streams are such as to render the use of the hydraulic method possible; and it is certainly but reasonable to expect that the time is not far distant when with the aid of proper and skilled mining experience, and by the judicious expenditure of capital, the gold industries of this portion of the Dominion will be found to be equally valuable with those either of British Columbia or of Nova Scotia.

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The Botanist.—Being the Botanical Part of a Course of Lectures in Natural History, Delivered in the University of Cambridge, together with a Discourse on the Principles of Vitality, by Benjamin Waterhouse, M.D., Boston, 1811.

By H. Beaumont Small, M.D.

There has recently come into my possession a copy of the first botanical lectures delivered in America. Just one hundred years ago, 1788, Doctor Benjamin Waterhouse was authorized by Harvard University to deliver to "such students as shall obtain permission from their parents or guardians, a course of lectures on Natural History." The book itself was printed in 1811, but the lectures are corrected up to, and dated, 1804.

It is somewhat out of place to take up the time of the meeting with such a paper, but the fact of these lectures being the beginning of the teaching of botany in this country, and the strangeness of some of the views expressed in them, may give it interest. I shall only refer as concisely as possible to some of the most striking oddities that have attracted my attention.

The lectures follow much the same course as those delivered at the present day. They commence with the seed and continue with a consideration of the stem, leaves, buds, blossoms and fruit. Interspersed are a history of the science of botany, sketches of the lives of Linnaeus, and other of the early botanists, and a history of botanic gardens. The last seems to have been suggested by the fact that such a garden was being talked of at the University at the time.

His opening remarks seem to imply that the lectures on other branches of natural history had been delivered, and that now he entered the field of botany. They also indicate the novelty of the subject:—

"As natural history is a subject that has excited some attention for more than a dozen years past at the University in this place; and as that branch of it denominated botany has lately become a topic of conversation, and likely to become more so, we have thought that it would conduce to good, if we laid before the public a few essays on this pleasant department of nature."

Further on we learn what he proposes:—"Some of the leading principles of this charming science we mean to extend through a series

of monthly essays.....We shall give our doctrine a dress partaking more of the popular than of the scientific garb."

His tenets he states plainly :—"We avow Linnaeus to be our lawful chief; and his *Philosophia Botanica* our rallying point and standard."

In describing the seed, he likens it to an egg, and states that they are "in structure, essentially the same. It (the seed) is not a dead substance like a pebble or a pearl; but it is a body regularly organized and arranged harmoniously into a system of vessels, glands and membranes; and it is, moreover, like a prolific egg, alive, or at least in a state of fitness to be acted upon by certain external agents, which agents are fire (caloric), air and water." After further comparisons, he continues :—"there is a small quantity of vital air in a sac, bladder or partition at the big end of every bird's egg; and we presume that there is a small portion of the same kind of fluid in every seed; or it may be oxygen in a concentrated state, which is afterwards combined with caloric in the process of incubation."

As to the food of plants, he says :—"From numerous well conducted experiments, it appears that a *mucilage*, produced by the decomposition of vegetable and animal recrements, constitutes the food or aliment of plants. This mucilage is formed from stable manures, from rain water putrified, from dew, as well as from dead animals and vegetables.....To reconcile the doctrine taught by some, that *salt* is the active principle in manures, it should be remembered that putrifaction has two stages; the first converts animal and vegetable substances into a mucilage, and the second converts that mucilage into one or more species of salt."

Describing the structure of plants, he is generally very correct, but some of the parts were hardly understood, for instance :—"The principal vessels are of two kinds, *tubes* and *cells*. The tubes run from the roots to the different parts of the plant.....they terminate in the *cells*, which cells contain the peculiar juices of the plant. The tubes contain the sap-juice."

He also says :—"In the root, the tubes are opened only at the extreme point, and fluids cannot be absorbed anywhere else."

The *pith*, particularly, is remarkable. "It is a spongy or vesicular substance, according to Linnaeus, essential to the life of the vegetable. .....It gives birth to the buds.....Some botanists of the first rank believe that it is, in a plant, what the brain and spinal marrow are in the inferior order of animals."

The vascular system is stated to be made up of three kinds of vessels :—"The sap vessels, which convey the sap-juice.....They run perpendicularly, and pass principally between the wood and the bark ; and though imperceptible, they must pervade other parts.....

"The proper vessels.....which contain the peculiar scented fluids.

"The air vessels.....These are found in the wood and in the alburnum, but not in the bark.....They carry other fluids besides air."

In describing buds, he recognizes the fact that some give rise to the leaf and some to the flower, but continues :—"As many plants have no buds,.....it is evident that buds are not parts essential to a vegetable."

"Close observers of nature have remarked that, about midsummer, there is a kind of pause in vegetation, for perhaps a fortnight ; and it is believed that leaf buds may be changed into flower buds, and flower buds into leaf buds. The probability of this idea is confirmed, says the ingenious author of 'The Botanic Garden' (Darwin), by the curious conversion of the parts of a flower into green leaves."

The leaves he terms, as we do to-day, the lungs of the plant, and describes two sets of vessels in them, as in the human body, one to convey the sap to the surface to be acted upon, the other set to carry back the improved fluid. The varnish on leaves he claims to be beeswax.

His knowledge of the anatomy of the parts of the flower was, of course, very perfect, modelled as it was on the teachings of Linnaeus, but whenever he launches into theory he is lost—for instance, in discussing the secretions of the flowers :—

"An insect is nourished by honey. May it not be needful that the flower, during the process of fructification, should be nourished by honey from the nectaries? Sugar is formed in the joints of the canes, for, perhaps, a similar purpose."

The production of wax is also explained:—

"This powder (*pollen*) is collected by the bees; and is formed by some secret process in their bodies into wax; which is a singular species of vegetable oil, rendered concrete by a peculiar acid in the insect."

In discussing the uses of the several parts of the flower he says:—"We cannot believe, with most botanists, that the corolla has no other use in the vegetable economy than merely to cover and guard the sexual organs.....An artery belongs to each portion of the corolla; which conveys the vegetable blood to the extremities of the petal, there exposing it to the *light* and to the *air*, under a delicate membrane; when it often changes its color, and is seen beautifully in partly-colored tulips and poppies.....It is presumed that this breathing and circulating structure has for its end the sustenance of the anthers and stigma; as well as for the elaboration of honey, wax and essential oil; and for perfecting the prolific powder."

He thus describes Linnaeus's theory of fructification:—"The medullary part of the plant, that is to say, the pith, must be joined with the external or cortical part, for the purpose of producing a new one. If the medulla be so vigorous as to burst through its containing vessels and thus mix with the cortical part, a bud is produced; otherwise, the medulla is extended until it terminates in the pistellum; and the cortical part is likewise elongated till it terminates in the antheræ."

Such are a few of the lessons taught to our first botanists. Many others might have been instanced, but these are sufficient to give an idea of the obscurity of many of the points. In the anatomy of the plants he is as proficient as we are at the present day, and the descriptions are exactly such as will be found in our text books; it is in the physiology of vegetable life that he fails, and it is here that all the progress has been made since that time.

One thing particularly noticeable is the excellence of the language and composition, and the care shown in the arrangement of each lecture; also the success of his efforts to make them interesting and attractive. To give you an idea of this feature of his work, it will not be out of place to conclude with the following extract from one of his lectures.

He refers to the discontent of human nature, and continues, alluding to man :—"He is apt to compare himself to the plant, and to repine at the difference. He observes the pride of our forests, shedding his leaves in the autumn ; and sees them renovated in the spring, and going on re-clothing and flourishing through ages, while he, surveying his decayed and nerveless limbs, sighs out in despair :—'There is no returning spring for me !'.....The plant is annually renovated, while the lord of the earth, with all his towering faculties, withers and sinks. But this is judgment by sense and sight alone.

Believe the muse : the wintry blast of death
Kills not the buds of virtue ; no, they spread
Beneath the heavenly beam of brighter suns,
Thro' endless ages, into higher flowers.'"

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EXCURSION TO KINGSMERE.

The first general excursion of the season was held on May 18th. The opportunity it afforded for a day's outing was taken advantage of by about one hundred and forty of the members and their friends, thus making it the most largely attended excursion ever held by the club. King's Mountain, the highest of the Laurentian Hills in this neighborhood, was the objective point, and the route lay along what is known as the "lower road," which leads through one of the most picturesque stretches of country in this vicinity. Fairy Lake, lying to the south of the road, is aptly named, for it is a most beautiful and dainty little sheet of water, fringed with trees, and nestling snugly among the surrounding hills. Further west the road skirts the base of a bold jutting spur of the mountains, while stretching away towards Aylmer, lies a broad flat plain of excellent farming land, dotted with well kept and prosperous-looking homesteads. All along the road the air was heavy with the perfume of lilacs and late apple blossoms, and the Bobolinks hovering over the luxuriant green meadows made the air ring with their liquid musical notes, whilst butterflies of varied hues added further brilliance to the sun-lit landscape. With such sights and sounds to divert their attention, the excursionists hardly realized that it was "ninety in the shade," and enjoyed the drive in spite of the heat, but,

when the foot of the mountain was reached, they did not forget that it was lunch time, and before long had reduced the weight of their baskets to such an extent that they could easily be carried up the steep mountain road to the rendezvous at the west end of Kingsmere.

After a short rest, a large number of the excursionists ascended the mountain by the winding path prepared for the Princess Louise, while two of the more adventurous climbed the face of the hill, a steep and arduous climb, especially on such a hot day. Here, spread out before them, and stretching for miles to the east, south and west, lay the beautiful Ottawa Valley, diversified by hill and plain, woodland and open country, and dotted with scattered villages, hamlets, and homesteads. Like molten silver under the now hazy sunlight, ran the Ottawa, sweeping in grand curves across the landscape, here widening out into a majestic lake, and there stretching its tributary arms to the north and south. In the middle distance rose the towers and spires of Ottawa and her twin sister, Hull, and to the north, as far as the eye could reach, lay the "everlasting hills," their rugged deformities of outline but little softened by their enfolding mantle of green forest.

After enjoying to the full the many beauties of the scene, as well as the delightfully cool breeze wafted from the lake at Aylmer, the party started for the rendezvous and found it a good deal easier coming down than going up.

When all had assembled at the foot of the hill, they were photographed by Mr. Jarvis, who is a member of the club, after which the President, Dr. R. W. Ells, made a short but pithy address, which was received in a manner that showed the popularity of the new president of the club. He was followed by Mr. Jas. Fletcher, who, as leader of the entomological branch, made some very interesting remarks on the insects collected during the day. Mr. H. M. Ami then spoke in his usual interesting way of the rocks which form the Laurentian Hills, and which belong to the oldest geological formation known; and Mr. R. B. Whyte brought the proceedings to a close with a short but clear account of the structure and habits of some of the most noteworthy plants found in bloom.

A start was made for home, by way of Chelsea, at 5.30 p.m., and after a pleasant drive in the cool air of the evening, enlivened by some

fine impromptu singing, the party reached the city about 8.30, and all agreed, as they dispersed, that, in spite of the heat and the mosquitoes, they had thoroughly enjoyed their day's outing.

The horses employed suffered considerably from the intense heat, but everything possible was done to lighten their labors, the occupants of the vans alighting and walking whenever a hill or a sandy piece of road was reached.

W. A. D. L.

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EXCURSION TO MONTEBELLO.

The second general excursion of the season was, owing to the threatening weather of the 22nd June, the day fixed for it, the smallest in point of attendance ever held by the club. Only twelve were present, but of these five were leaders, representing the branches of botany, entomology, ornithology and general zoology. It was intended to go by steamer "Empress" to Buckingham, P. Q., and investigate the natural history of that locality, but it was found impracticable to land there, owing to the high water. Thus the little party, who had braved the rain, were compelled to seek a field for their researches farther down the river, and they chose Montebello. The weather in the meantime had turned out quite fine, and the excursionists, after exploring their lunch baskets with very satisfactory results, set out to do the same by the surrounding country. They found the hill behind the village so picturesque at a distance none the less so on a nearer approach. With its beautiful little brooks tumbling over moss-covered rocks, and winding in and out amongst tangled thickets and open forest glades, its artificial, but apparently natural, fountain, throwing a jet of water thirty feet high, in one of the most secluded spots of the mountain side, and its wealth of birds, insects, and flowers, all declared it to be one of the most beautiful and interesting collecting grounds ever visited by the club. From the hill-top a fine view can be had of the river and the surrounding country, with the village, and the Papineau mansion and grounds, in the foreground. Several rare and beautiful plants of the orchid family were found by the botanists, and the workers in the other branches had good reason to be satisfied with the result of their labors. A feature of

the excursion in which much interest was taken was a competition among the younger members of the party in plant collecting, for which three prizes were offered. The first was won by Miss Marion Whyte, with 97 species; the second by Miss Lillie Ballantyne, with 73; and the third by Miss Ida Whyte, with 46. Short addresses were given on the boat, while returning, by Mr. Whyte on the plants collected during the day, by Mr. MacLaughlin on the insects he had captured, and by Mr. Lees on the birds he had observed. The steamer reached the wharf about 8 p.m., and the party dispersed, somewhat tired, but thoroughly satisfied with their day in the woods and on the water.

W. A. D. L.

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REPORT OF THE CONCHOLOGICAL BRANCH, FOR THE YEARS 1887-88.

To the President and Council of the Ottawa Field-Naturalists' Club.

GENTLEMEN,—As no report from this branch was presented last year, what I now have the honor to submit covers observations made in 1887 as well as 1888.

The Ottawa was lower in 1887 than in any year since 1881, and as a consequence the many beautiful shells which occur in that river were easily accessible. From August to October numerous visits were paid to Duck Island, the metropolis of the Unionidæ in this vicinity, and large collections of fine shells were there obtained. *Unio occidens* was abundant along both shores of the lower half of the island; and from the thousands of this species visible in the shallow water, selections were made which rival, if they do not surpass, in variety and richness of coloring, any shells procurable from any inland waters in the world. Indeed few sea shells equal in beauty this remarkable species, which exists in such abundance at our very doors. Why the shell should vary so greatly in color under precisely similar circumstances is a question not easily solved. Other species from Duck Island vary greatly in form, though not in color; while others again are remarkably constant; but all the shells found in the vicinity are much finer than I have ever observed the same species to be in other localities.

Our commonest Unio—the commonest, in fact, of the whole Atlantic drainage; *Unio complanatus*—is there found in forms very

different from those occurring elsewhere. One of these, which is undoubtedly entitled to rank as a distinct variety, was first found in 1881; and no specimens were obtained in any year since until 1887. It seems confined to the lower part of the island, and is least rare along the southern shore. The shell is very large for the species, and is marked by numerous, distinct, dark-green rays. The beauty and comparative rarity of this form render it one of the most desirable of our shells. I can suggest no reason why it should so widely differ from the ordinary *Unio complanatus* found in the same locality.

It will doubtless be remembered that Mr. Heron included *Unio alatus* in his list of Ottawa shells, but without stating where it was found. I never observed it until September, 1887, when I obtained a few living examples on the south shore of Duck Island. Mr. Ami informs me that he has taken shells of this species near the same locality, at the mouth of Green's Creek.

Late in the season a great number of *Unio ellipsis* became stranded on shoals opposite Templeton Wharf and perished. Many larger specimens than ever previously noted were observed among the dead shells. One remarkably large and beautiful living example of *Margaritana undulata* was collected in the same locality, as were also a dozen beautiful specimens of *Unio gracilis*.

A list of the *Unionidæ* found at Duck Island will probably be of interest. The following are the shells of this family which I have observed to occur there:—

Unio occidens, Lea.
Unio complanatus, Solander.
Unio alatus, Say.
Unio gibbosus, Barnes.
Unio borealis, A. F. Gray.
Unio rectus, Lamarck.
Unio gracilis, Barnes.
Unio ellipsis, Lea.
Margaritana undulata, Say.
Anodonta fluviatilis, Dillwyn.
Anodonta undulata, Say.

The pond on the island teems with the smaller forms of fresh water shells—*Sphæria*, *Amnicolæ*, *Limnææ* and *Planorbes*. On the whole, Duck Island is undoubtedly the richest collecting ground within the sphere of the Club's operations.

Another locality rich in shells of an entirely different character is Meech's Lake. A few years since two specimens of a very large form

of *Planorbis bicarinatus* were collected there, and noted in one of the reports of this branch. A visit to the lake in August, 1887, resulted in the discovery of a locality in which this variety occurs in great abundance, associated with very large specimens of the shell we have so long called *Physa Lordi*. This locality lies on the west shore of the lake near the house of a farmer named Gillian. One striking peculiarity noticed among the *Planorbes* was that about five per cent. of the animals were of just such a reddish tint as the most highly colored shells of *Unio occidens*. Specimens which I kept living for a few weeks were losing their rich color when they died. I refer to this with a view of directing attention to the danger of basing any specific differences on the color of the animal itself. This *Planorbis* from Meech's Lake is of six or eight times the cubical capacity of the same species as found in the Rideau and Ottawa. In our woodland streams occurs a third form, which is stunted in growth and much distorted, owing, no doubt, to the vicissitudes it has to undergo in localities where at times there is a flood running and at other periods scarcely a drop of water.

Another shell that is well worthy of note is found in abundance in the Rideau River and less commonly in several other streams. It is the species called by authors *Planorbis corpulentus*. The true *corpulentus* described by Say is an entirely different shell. That great naturalist found his types in the lake of the Woods, in what is now part of the Province of Ontario. They were lost on the return journey, and until Mr. James Fletcher collected specimens in the original locality in 1885, it was, it would appear, generally believed that Say made some mistake in the figure he gave of the species. Subsequent writers on shells professed to know more about the matter than Say, and gave the name "*corpulentus*" to an entirely different shell—the same species undoubtedly which occurs so commonly in the Rideau from the Rifle Range upward at least to Black Rapids. All along this reach of water the shell occurs in company with the form of *Planorbis trivolvis* so common everywhere in this vicinity. I have found the two associated not only in the Rideau but in Nepean Bay, Brighams Creek, and the Pêche River, in Masham. The shells are in my opinion quite distinct. What I consider a distorted form of the larger shell has been described by Mr. Whiteaves from Montreal, and named *Planorbis macrostomus* The same form is

common in the ponds to the north of St. Louis Dam, near the Experimental Farm.

Mr. Harrington has collected in moss a great number of our smaller shells. One new to our list is *Vertigo ventricosa*, Morse. I thought I had the shell some years ago, but my specimens were merely *V. ovata*, with only one of the labial teeth developed. Since finding the species among Mr. Harrington's shells, I have observed it among my own, mixed with *V. gouldii*. The difference is not easily perceptible under a hand lens, but with the microscope it is quite apparent. *V. ventricosa* has nearly a whorl less, and is considerably less slender. I think it is more common on the Hull side of the Ottawa, as it is there I collected most of the shells among which I have noticed *V. ventricosa*.

In conclusion I have to express my regret that with the present report must close my active connection with this interesting study. Happily the club now includes among its members not a few gentlemen who have all the qualifications necessary to carry on properly the work of the Concholgical Branch.

F. R. LATCHFORD,
Leader.

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SPRING REPORT OF THE ORNITHOLOGICAL BRANCH.

To the President and Council of the Ottawa Field-Naturalists' Club:

GENTLEMEN,—In presenting their Spring report, the leaders of the Ornithological Branch must congratulate you on the increased interest shewn by the members of the Club in the work of this branch during the present season. Including the leaders, there have been seven observers in the field who sent in lists of their observations. The results of their work are embodied in the subjoined list of Spring arrivals. Notwithstanding these facts, however, only one addition has been made to the list, which seems to indicate that the field in this direction has been pretty thoroughly gone over, though much still remains to be done in working out the life histories of the birds of this district.

The addition to the list is:—*Falco peregrinus anatum* (Bonap.), Duck Hawk. A specimen of this bird was observed by Mr. G. R.

White and several others, on 28th April, flying low over the Rideau Rifle Range, but was not shot.

The following are some of the more noteworthy finds of the season :—

Nyctala Tengmalmi Richardsoni, Richardson's Owl; seen Feb. 21st, in a garden near the city. It allowed a near approach, and, in consequence, was easily identified by Messrs. N. F. Ballantyne and W. A. D. Lees.

Ampelis garrulus, Bohemian Waxwing. Mr. W. Macoun reports having seen a flock of 20 or 30 of these birds, near St. Andrew's Church, on 2nd June. This is an unusual occurrence at this time of year, the bird being a rather uncommon winter visitor here.

Spizella pusilla, Field Sparrow; observed in the corner of a pasture field on the Hurdman Farm, near the city, on 16th June, by Mr. Lees, and on 23rd June, by Messrs. Lees and Ballantyne. On both occasions it was accompanied by a Chipping Sparrow (*Spizella socialis*), and was heard singing. Being seen at a distance of only a few feet with a good glass, its pink bill could be easily distinguished.

Cistothorus palustris, Long-billed Marsh Wren; found common, and breeding, in the marshes along the Rideau River, from fifteen to twenty miles from the city, by Messrs. A. G. Kingston and C. E. Chubbock, on 20th June. After examining several nests, Mr. Kingston found one containing six eggs, two of which he took. On 30th June, Mr. Lees examined about a dozen nests in the same locality, but found no eggs, although the birds, in most cases, loudly asserted their claims to ownership of the nests. Mr. Kingston thinks he also saw one specimen of the short-billed species (*C. stellaris*), but could not make sure of it.

Unusually large numbers of Pine Grosbeaks and of American, and White-winged, Crossbills (the latter predominating) were observed here during the winter, and the Hudsonian Chickadee was noticed to be tolerably common in Dow's Swamp. The American Crossbills were also seen on 19th June, a rather unseasonable time for winter birds, and a Sparrow Hawk was observed on 26th January, the earliest previous record being 7th April.

On 28th April, 18 hawks were seen, soaring over the city at a great height, and moving gradually northward in large circles, but keeping together in a body.

The past Spring has been an unusually early one in bird migration, 35 new records having been made, and 8 earliest previous ones tied.

Following is a list of the dates on which the birds were first observed. Those marked (*) are the earliest recorded by the Club :—

Jan.	1.	*Parus atricapillus*, Chickadee.
"	2.	*Bonasa umbellus togata*, Canadian Ruffed Grouse.
"	2.	*Cyanocitta cristata*, Blue Jay.
"	2.	*Plectrophenax nivalis*, Snowflake.
"	6.	*Pinicola enucleator*, Pine Grosbeak.
"	12.	*Loxia leucoptera*, White-winged Crossbill.
"	12.	*Acanthis linaria*, Redpoll.
"	13.	**Corvus americanus*, American Crow.
"	13.	**Spinus tristis*, American Goldfinch.
"	13.	*Lanius borealis*, Northern Shrike.
"	13.	*Sitta carolinensis*, White-breasted Nuthatch.
"	15.	*Spinus pinus*, Pine Siskin.
"	20.	*Loxia curvirostra minor*, American Crossbill.
"	26.	**Falco sparverius*, American Sparrow Hawk.
Feb.	3.	*Parus hudsonicus*, Hudsonian Chickadee.
"	11.	**Carpodacus purpureus*, Purple Finch.
"	12.	*Accipiter atricapillus*, American Goshawk.
"	17.	**Dryobates pubescens*, Downy Woodpecker.
"	21.	*Nyctala tengmalmi richardsoni*, Richardson's Owl.
Mar.	2.	*Otocoris alpestris*, Horned Lark.
"	6.	**Junco hyemalis*, Slate-colored Junco.
"	19.	*Accipiter velox*, Sharp-shinned Hawk.
"	22.	*Merula migratoria*, American Robin.
"	22.	**Sialia sialis*, Bluebird.
"	23.	**Quiscalus quiscula æneus*, Bronzed Grackle.
"	23.	**Spizella monticola*, Tree Sparrow.
"	23.	**Melospiza fasciata*, Song Sparrow.
"	27.	**Spizella socialis*, Chipping Sparrow.
"	31.	*Dryobates villosus leucomelas*, Northern Hairy Woodpecker.
"	31.	**Molothrus ater*, Cowbird.
April	1.	**Sturnella magna*, Meadowlark.
"	1.	**Scolecophagus carolinus*, Rusty Blackbird.
"	5.	*Glaucionetta clangula americana*, American Golden-eye.
"	8.	*Sayornis phœbe*, Phœbe.
"	9.	**Anas obscura*, Black Duck.
"	9.	**Ceryle alcyon*, Belted Kingfisher.

April 10. **Ammodramus sandwichensis savanna*, Savanna Sparrow.
" 10. *Tachycineta bicolor*, Tree Swallow.
" 11. *Sphyrapicus varius*, Yellow-bellied Sapsucker.
" 11. *Agelaius phœniceus*, Red-winged Blackbird.
" 11. *Poocætes gramineus*, Vesper Sparrow.
" 11. **Zonotrichia albicollis*, White-throated Sparrow.
" 11. *Certhia familiaris americana*, Brown Creeper.
" 11. *Regulus satrapa*, Golden-crowned Kinglet.
" 12. *Circus hudsonius*, Marsh Hawk.
" 12. **Buteo lineatus*, Red-shouldered Hawk.
" 12. American Goldfinch (summer plumage).
" 12. **Troglodytes hiemalis*, Winter Wren.
" 13. *Larus argentatus smithsonianus*, American Herring Gull.
" 13. *Falco columbarius*, Pigeon Hawk.
" 13. *Progne subis*, Purple Martin.
" 14. *Colaptes auratus*, Flicker.
" 14. **Turdus aonalaschkæ pallasii*, Hermit Thrush.
" 16. *Troglodytes, ædon*, House Wren.
" 16. **Regulus calendula*, Ruby-crowned Kinglet.
" 18. *Lophodytes cucullatus*, Hooded Merganser.
" 18. **Passerella Iliaca*, Fox Sparrow.
" 19. *Anas boschas*, Wood Duck.
" 19. **Branta canadensis*, Canada Goose.
" 19. **Gallinago delicata*, Wilson's Snipe.
" 19. **Totanus flavipes*, Yellow-legs.
" 19. **Buteo borealis*, Red-tailed Hawk.
" 19. **Chelidon erythrogaster*, Barn Swallow.
" 19. *Sitta canadensis*, Red-breasted Nuthatch.
" 21. *Buteo latissimus*, Broad-winged Hawk.
" 22. **Picoides arcticus*, Arctic Three-toed Woodpecker.
" 22. *Turdus fuscescens*, Wilson's Thrush.
" 23. *Pandion haliaëtus carolinensis*, American Osprey.
" 23. *Clivicola riparia*, Bank Swallow.
" 24. *Actitis macularia*, Spotted Sandpiper.
" 27. *Melospiza georgiana*, Swamp Sparrow.
" 28. **Falco peregrinus anatum*, Duck Hawk.
" 28. **Chætura pelagica*, Chimney Swift.
" 28. *Harporhyncus rufus*, Brown Thrasher.
May 1. **Lanius ludovicianus excubitorides*, White-rumped Shrike.
" 2. **Seiurus aurocapillus*, Ovenbird.
" 4. *Melanerpes erythrocephalus*, Red-headed Woodpecker.
" 5. *Mniotilta varia*, Black and White Warbler.
" 6. **Asio accipitrinus*, Short-eared Owl.
" 6. **Tyrannus tyrannus*, Kingbird.

May 6. **Vireo gilvus*, Warbling Vireo.
" 6. *Dendroica æstiva*, Yellow Warbler.
" 7. *Empidonax minimus*, Least Flycatcher.
" 7. *Icterus galbula*, Baltimore Oriole.
" 7. *Zonotrichia leucophrys*, White-crowned Sparrow.
" 7. *Habia ludoviciana*, Rose-breasted Grosbeak.
" 7. **Vireo solitarius*, Blue-headed Vireo.
" 7. *Dendroica coronata*, Myrtle Warbler.
" 8. *Clangula hyemalis*, Old-squaw.
" 8. **Vireo flavifrons*, Yellow-throated Vireo.
" 8. *Dendroica maculosa*, Magnolia Warbler.
" 9. *Myiarchus crinitus*, Crested Flycatcher.
" 9. *Compsothlypis americana*, Parula Warbler.
" 9. *Dendroica cærulescens*, Black-throated Blue Warbler.
" 9. **Dendroica pensylvanica*, Chestnut-sided Warbler.
" 9. *Dendroica blackburniæ*, Blackburnian Warbler.
" 10. *Colymbus holbœllii*, Holbœll's Grebe.
" 10. *Totanus solitarius*, Solitary Sandpiper.
" 10. **Coccyzus erythrophthalmus*, Black-billed Cuckoo.
" 10. *Contopus virens*, Wood Pewee.
" 10. *Ampelis cedrorum*, Cedar Waxwing.
" 10. **Galeoscoptes carolinensis*, Catbird.
" 11. *Antrostomus vociferus*, Whip-poor-will.
" 11. *Dendroica virens*, Black-throated Green Warbler.
" 12. *Vireo olivaceus*, Red-eyed Vireo.
" 12. *Seiurus noveboracensis*, Water Thrush.
" 12. *Setophaga ruticilla*, American Redstart.
" 12. *Anthus pensylvanicus*, American pipit.
" 14. *Trochilus colubris*, Ruby-throated Hummingbird.
" 14. *Dolichonyx oryzivorus*, Bobolink.
" 14. *Turdus mustelinus*, Wood Thrush.
" 15. *Chordeiles virginianus*, Night Hawk.
" 15. *Geothlypis trichas*, Maryland Yellow-throat.
" 17. *Accipiter cooperi*, Cooper's Hawk.
" 17. **Contopus borealis*, Olive-sided Flycatcher.
" 17. *Piranga erythromelas*, Scarlet Tanager.
" 17. *Dendroica tigrina*, Cape May Warbler.
" 17. *Dendroica castanea*, Bay-breasted Warbler.
" 19. *Philohela minor*, American Woodcock.
" 19. *Petrochelidon lunifrous*, Cliff Swallow.
" 19. *Sylvania canadensis*, Canadian Warbler.
" 20. *Ægialitis vocifera*, Killdeer.
" 22. **Geothlypis philadelphia*, Mourning Warbler.
" 24. *Botaurus lentiginosus*, American Bittern.
" 26. *Anas discors*, Blue-winged Teal.
" 27. *Vireo philadelphicus*, Philadelphia Vireo.
" 27. *Dendroica striata*, Black-poll Warbler.

May. 27. *Sylvania pusilla*, Wilson's Warbler.
" 30. *Turdus ustulatus swainsonii*, Olive-backed Thrush.
June 2. *Ampelis garrulus*, Bohemian Waxwing.
" 4. *Nycticorax nycticorax nævius*, Black-crowned Night Heron.
June 8. *Ardea herodias*, Great Blue Heron.
" 16. *Spizella pusilla*, Field Sparrow.
" 19. *Loxia curvirostra minor*, American Crossbill.
" 20. *Cistothorus palustris*, Long-billed Marsh Wren.
" 23. *Passerina cyanea*, Indigo Bunting.
" 23. *Helminthophila ruficapilla*, Nashville Warbler.

WM. A. D. LEES,
JOHN MACOUN,
GEO. R. WHITE, } *Leaders.*

Ottawa, 1st July, 1889.

CORRECTION.—In the report of the Ornithological Branch for 1888 (NATURALIST, Vol. II, p. 151, March, 1889), in line 21, for "new" read "rarer."

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BOOK NOTICES.

ON NEMATOPHYTON AND ALLIED FORMS FROM THE DEVONIAN (ERIAN) OF GASPÉ AND THE BAIE DES CHALEURS, by Prof. D. P. Penhallow, (with introductory notes, by Sir William Dawson, F.R.S). Trans. Roy. Soc. Can., Vol. VI, 1889, p. 27.

This paper contains an able exposition of the new facts and relations concerning this obscure tree-like plant-remain which has caused so long and so interesting a discussion between Prof. Carruthers, Sir Wm. Dawson and others both in the old and the new world.

Part I opens with an "Introductory note," by Sir Wm. Dawson, in which he gives an historical sketch of the discovery of those fossil plants which were at one time referred to the genus *Prototaxites*. Sir Wm. Logan, Sir Wm. Dawson, Dr. G. M. Dawson, Prof. Kennedy, Dr. Bell and others had discovered them in Canada, whilst Dr. Henry Hicks and Prof. Etheridge had also obtained them in shales of the Ludlow formation, and from the "Denbighshire grits." The geological relations of the strata in which these fossil plants occur are then discussed, the species of fossil fishes *Coccosteus, Ctenacanthus, Leptacanthus* and *Machæracanthus* are enumerated and notes are given on other species of fossil remains.

Part II. This part deals with the "notes on the fossils" in question in which Prof. Penhallow reviews the literature of the subject in a clear and lucid manner, giving a full description of (*a*) the "external characters" of *Nematophyton Logani*, Dn. and (*b*), its "internal structure," which is the result of the examination of a large series of microscopic slides of sections taken in every direction imaginable. Longitudinal sections show that the principal part of the structure is composed of tubular cells of indeterminate length. Cross sections, on the other hand, reveal a series of large rounded cells with "intercellular areas," which are more or less occupied by a system of much smaller, rather thin-walled filamentous cells. More minute details of the structure and arrangements of parts are given, which altogether furnish means of recognizing the general relations and characters of the genus which Sir Wm. Dawson proposes. In this genus *Nematophyton* three species are included: *Nematophyton Logani*, (Dawson); *Nematophyton laxum*, (Penhallow); *Nematophyton Hicksi*, (Etheridge). Plates I and II of this volume of the Transactions of the Royal Society of Canada contain eight figures giving the microscopic characters of the species which are reproduced by photo-lithograhy.

NOTE.—At the last meeting of the Royal Society. of Canada, May, 1889, Prof. Penhallow read a paper entitled "Notes on Erian Plants," in which he offers additional notes upon *N. Logani* and also revises the descriptions of *Nematoxylon crassum and Celluloxylon primævum.* The former he shows to be a species of *Nematophyton* for which he retains the specific name of *crassum.* The latter is also shown to be a highly altered form of *Nematophyton*, and he refers it to *N. crassum.* A complete revision of the genus is also given.

H. M. A.

ON SOME REMARKABLE ORGANISMS OF THE SILURIAN AND DEVONIAN ROCKS IN SOUTHERN NEW BRUNSWICK. By G. F. Matthew, M.A.

In Vol. VI of the Trans. Roy. Soc. Can., p. 49, *et seq.*, Mr. Matthew figures (plate IV) and describes six very remarkable organisms from the fossiliferous strata of southern New Brunswick, which make an interesting addition to our knowledge of the Silurian and Devonian fossils of that Province. The paper opens with a revised and extended

description of the Silurian fish, *Diplaspis Acadica*, which was described by Mr. Matthew for the first time in Vol. II of the *Canadian Record of Science*, p. 251. The description of the related genera and species, as well as the geological horizon from which the species comes, are next given. Then follows the description of a new species of *Ceratiocaris* (McCoy), or *Phinocaris* (Clarke), viz., *C. pusillus*, obtained at the same locality as the *Diplaspis*, viz., Cunningham Brook, near Westfield Station, N. B. With these there was also found the type of a new genus of crustacean allied to certain forms of Packard's sub-order *Synxiphosura*, and for which Mr. Matthew proposes the generic designation *Bunodella*, and describes the species as B. *horrida*.

The second part of the paper contains descriptions of the Devonian forms, and includes: 1, One orthopterous insect; 2, a chitinous grub; and, 3, a new crustacean. The wing of the orthopterous insect upon which the genus and species are founded, was found in Plant bed No. 2 of the Cordaite shales of the Lower Devonian series at Lancaster, N.B., where Prof. Hartt discovered *Xenoneura antiquorum* years ago. It goes under the name of *Geroneura Wilsoni*. The grub is described as *Archæoscolex corneus*, and is "the first example of the body of an insect recognised among the Devonian shales at St. John." *Eurypterella ornata* is the name applied to a supposed crustacean of small size from the same beds as *Geroneura Wilsoni*, and was found by Mr. W. J. Wilson, who collected nearly all the material from which the above species were described and figured.

The following is a *resumé* of the species described:—

Silurian.	Devonian.
1. *Diplaspis Acadica* (Matthew).	1. *Geroneura Wilsoni*, N. sp.
2. *Ceratiocaris pusillus*, N. sp.	2. *Archæoscolex corneus*, N. sp.
3. *Bunodella horrida*, N. sp.	3. *Eurypterella ornata*, N. sp.

H. M. A.

Illustrations of the Fossil Fishes of the Devonian Rocks of Canada; Part II. By J. F. Whiteaves. Trans. Roy. Soc. Can., Vol. VI, pp. 77–96; plates V–X.

This admirable paper is a continuation of a previous contribution by the same author to the Transactions of the Royal Society of Canada,

Vol. 4, p. 101, in which *Bothriolepis Canadensis* (Whiteaves), *Acanthodes Mitchelli?* (Egerton), *Acanthodes concinnus* (Whiteaves), and *Phaneropleuron curtum* (Whiteaves) are described, either for the first time or more in full than in the original papers which announced the important discovery of fishes in rocks of Devonian age, in part the equivalents of the Old Red Sandstone of Scotland, from which Hugh Miller's celebrated collections were obtained, and which the famous Louis Agassiz described in his "*Poissons Fossiles du Vieux Grès Rouge.*"

In the last volume of the Transactions of the Royal Society of Canada, Mr. Whiteaves describes the remaining species of Upper and Lower Devonian fish-remains which had been collected by Mr. Foord, Dr. Ells, and other officers of the Geological Survey Staff, in the Baie des Chaleurs region. The paper contains descriptions and illustrations of five species "from the Upper Devonian Rocks of Scaumenac Bay, P. Q.," together with a note on *Bothriolepis Canadensis* (Whiteaves), besides "Descriptions of Species from the Lower Devonian Rocks of Campbellton, N. B.," which include descriptions and figures of four species.

In the *first* part of the paper the following forms are described :—*Glyptolepis Quebecensis*, N. sp., *Eusthenopteron Foordi* (Whiteaves), *Cheirolepis Canadensis* (Whiteaves), *Bothriolepis Canadensis* (Whiteaves, note), *Acanthodes affinis*, N. sp., *Phaneropleuron curtum* (Whiteaves).

Each species receives its full share of careful examination; details of description are given so that any observer may easily recognise the species in question. Of *Eusthenopteron Foordi* a very exhaustive diagnosis is furnished, in which quite an array of new facts are recorded for the first time.

The *second* part of this paper includes descriptions of the following forms :—*Cephalaspis Campbelltonensis* (Whiteaves), *Coccosteus Acadicus* (Whiteaves), *Ctenacanthus latispinosus* (Whiteaves), *Homocanthus gracilis*, N. sp. They occur associated with intrusive rocks occurring at the base of the Devonian of that region.

Most of the illustrations were drawn by Mr. Lawrence M. Lambe, artist to the survey, who also helped in a study of the several forms under consideration. These two parts (Parts I and II) of "Illustrations

of the Fossil Fishes of the Devonian Rocks of Canada" are amongst the most important contributions to Canadian Palæontology ever published.

H. M. A.

NOTES ON THE PALÆOZOIC BIVALVED ENTOMOSTRACA.—No. XXVII. ON SOME NORTH AMERICAN (CANADIAN) SPECIES. By Prof. T. Rupert Jones, F.R.S., F.G.S.

No. XVII of the Annals and Magazine of Natural History, for May, 1889, pp. 373–387, contains an interesting contribution to the knowledge of some critical forms of Canadian Primitian and Beyrichian Ostracoda, which were sent to Dr. Jones by Mr. Whiteaves, of the Geo. Geological Survey of Canada, for examination and study. The species therein described were collected: 1. From the Lower Devonian of Campbellton, New Brunswick, associated with *Coccosteus Acadicus* (Whiteaves) and *Cephalaspis Campbelltonensis* (Whiteaves), etc; 2. from the Lower Helderberg (Ludlow) formation of Cape Bon Ami, New Brunswick; and 3. from St. Andrews, Manitoba.

Devonian—From Campbellton Prof. Jones recognizes his *Primitia mundula* and several of its varieties, which have been heretofore described in previous numbers of the "Annals, etc.," whilst he finds a new species, viz.: *Primitia scaphoides*, which is compared to *P. semicordata* (Jones).

Silurian—From the Lower Helderberg formation of Cape Bon Ami the following forms are recognized, viz.: *Primitia mundula* (Jones), var.; *P. æqualis* (Jones and Holl), Young form.; *Beyrichia Klædeni* (McCoy), var. *Acadica*, N. var. (Jones), along with *Beyrichia arcuata* (Bean) and *Isochilina labron*, N. sp.

Cambro-Silurian or Ordovician—The Manitoba specimen is described by Dr. Jones under the name of *Aparchites Whiteavesii*, Aparchites being "a generic group separable from Primitia (though there are some passage forms)."

Two lithographic plates accompany the text. It would be a decided advantage if the figures were magnified in all cases a uniform number of diameters. There are besides these figures six woodcuts which are very instructive.

H. M. A.

REPORT OF OBSERVATION OF INJURIOUS INSECTS AND COMMON FARM PESTS DURING THE YEAR 1888, BY MISS ELEANOR A. ORMEROD. F. R. Met. Soc., Etc.

The Twelfth Annual Report of our esteemed corresponding member, Miss Ormerod, has just come to hand, and is of great interest and utility not only to English readers, for whom it is specially prepared, but also for enlightened people in all parts of the world. The same general principles underlie the methods of prevention and remedy, for the injuries done to crops by insects wherever they may occur, and the practical common sense shown by Miss Ormerod in the careful discussion and treatment of the different attacks mentioned in the present report, added to the experience she has gained after years of constant study in a special line, should demand the recognition of the talented authoress as a public benefactor by the thoughtless millions who daily benefit from her labours in low prices for many of the necessaries of life. Ten per cent is a very low estimate of the amount of annual injury done to farm crops by insects, and this frequently runs up to 15, 25, or even 50 per cent. Of this large amount of loss, by far the greater part could be saved if our farmers and gardeners would only read such reports as Miss Ormerod has given us. Nothing can be truer than what she says so feelingly in her preface. "In a country such as this it appears an evil crying for removal that the *ignorance of the uneducated* should be allowed to cause, year by year, *such a demonstrable loss to* the nation." The attacks, mentioned in the report include, amongst others, the following orchard pests, which were very numerous in England during 1888. Apple Weevil, *Anthonomus pomorum*, Curtis. Green "Leaf" Weevil, *Phyllobius maculicornis*, Germ. Winter Moth, *Cheimatobia brumata*, L. Lackey Moth, *Clisiocampa neustria*, Curtis. Small Erminie Moth, *Yponomeuta padella*, Linn. Figure-of-8 Moth, *Diloba cæruleocephala*, Linn. Mottled Umber Moth, *Hybernia defoliaria*, Linn. A noticeable fact in the remedies proposed is that there is no mention of the arsenical poisons which are of such inestimable service in our large North American orchards, and which, with ordinary care, can be used with perfect safety. The attack of the Hessian fly on wheat, concerning which there was so much anxiety in England in 1887, seems to have decreased in a marked degree, and this

is doubtless owing to the attention paid by wheat growers to the advice given by Miss Ormerod.

Another satisfactory result of her labours is the decrease in the injury done by the ox warble fly; it is stated that "warble prevention has advanced much during the last season, and it is still more clearly shown than before that where the maggots are destroyed (as may easily be done) the attack may be for all practical purposes stamped out."

Injuries to beans, carrots, parsnips, and growing grain are also discussed. A new attack of particular interest, of which some particulars are given, is that of the wheat-flour moth. The importance of fighting it vigorously, however, seems to be appreciated, and we therefore trust that it will soon be got within control.

A special chapter upon the "sparrow nuisance" gives more facts to show the absurdity of the claims of those advocates who still try to uphold this pest on the plea that it is an insect-feeder.

J. F.

NOTES AND DESCRIPTIONS OF A FEW INJURIOUS FARM AND FRUIT INSECTS OF SOUTH AFRICA, BY MISS ELEANOR A. ORMEROD. F. R. Met. Soc., Etc.

This small 8vo. volume will, we believe, be of great value to the South African colonies. Considerable work has already been done there in economic entomology, but the publication of this work will undoubtedly give a special impulse to this branch of agriculture, which will be of lasting effect. In her modest preface the authoress speaks of it as "merely a fragment," but some of the monographs are very full, and the work is beautifully illustrated with clean figures.

J. F.

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EDITORIAL NOTES.

A letter has been received from Prof. Macoun, who, with his assisstant Mr. J. M. Macoun, is still in British Columbia, energetically working up the botany and zoology of the southern portion of that Province. The letter is dated at Kamloops, on 16th June, and states that they have been very successful in collecting specimens, having, at the

time of writing, secured over three hundred skins of birds and other animals, representing one hundred and twelve species, besides a large number of plants and entomological specimens.

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The next general excursion of the Club will be held on Thursday, 8th August, to the "Ox-bow" on the Nation River, near Casselman, on the invitation of Messrs. Wm. Craig and W. J. Summerby, two of our members who reside in the County of Russell. The place is one which should well repay a visit, and it is hoped that a large number of the members will avail themselves of the chance to become acquainted with a locality not before visited by the Club. Those so inclined will have an opportunity of exploring the spot where many interesting Indian relics have been and no doubt still are to be found, as it is within three miles of our stopping place, and the whole day will be at our disposal. Arrangements have been made with the Canada Atlantic Railway to let the excursionists off at the "Ox-bow," thus saving the walk from Casselman. Train leaves Elgin Street Station at 8 a.m., and returning, arrives at 8.30 p.m. Return fare, 75 cents.

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ERRATA.—The following names were, by an accident on the part of the printer, omitted from the list of members published in the last number of THE NATURALIST, and the omission unfortunately escaped notice:—C. E. Chubbock; John Hodgins; George Holland; Miss L. von Jantsch; Miss Ruby Rothwell; and T. W. E. Sowter. The editor tenders his apologies to these members for the oversight.

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NEW MEMBERS.—The following new members have been elected since the list of members for this year was published:—T. J. Alnwick; Robert Bell, M.D., LL.D.; Arthur Boulton; J. Carstairs; Rev. Charles S. Deeprose; W. F. Ferrier, B. App. Sc.; G. S. Macdonald; J. J. McNulty; F. Nelson, B.A.; J. M. Oxley; F. X. R. Saucier; C. W. Treadwell; J. G. Whyte.

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KALMIA.

1393. K. ANGUSTIFOLIA, L. (Lambkill, Sheep Laurel.)
Peat-bogs. July—!. (B.)
A showy shrub bearing a profusion of lateral corymbs of pinkish-crimson flowers.

1394. K. GLAUCA, Ait. (Pale Laurel.)
Peat-bogs. June—2. (B.)
Leaves almost sessile, branchlets two-edged, few-flowered corymbs terminal. Flowers paler and larger than in the last species.

LEDUM.

1396. L. LATIFOLIUM, Ait. (Labrador Tea.)
Peat-bogs. Common. May—4.
A charming shrub with terminal umbel-like clusters of white flowers. Leaves with a rusty woolly pubescence *beneath glandular* and aromatic.

PYROLA, L. Wintergreen.

1410. P. SECUNDA, L. (Green-flowered Pyrola.)
Swamps and rich woods. A pretty plant with the pale green flowers all turned to one side of the stem. July—1. (B)

1411. P. CHLORANTHA, Schwartz. (Yellow-flowered Pyrola.)
Dry open woods. Rather uncommon. Rockcliffe. Stewart's Bush. Aylmer. Chelsea. Leaves thick, dull green with pale veins. Flowers large and greenish yellow. July—1.

1412. P. ELLIPTICA, Nutt. (Shin-leaf.)
Rich woods. A lovely flower with large thin leaves and white flowers like lilies of the valley. June—2.

1413. P. ROTUNDIFOLIA, L. (Round-leaved Wintergreen.)
Sandy woods. This is a very variable species. What I take for the type has white flowers like *P. elliptica*, but thick roundish leaves and a more robust habit. Beechwood (*Dr. H. B. Small*). Billings Bridge. Hull. Aylmer. Chelsea. Rather uncommon. July—1. (B)

———— var. INCARNATA, D.C.
Peat-bogs. Common. Leaves thinner and smaller. Flowers pink. June—2.

———— var. ASARIFOLIA, Hook.

Damp woods. Rare. Aylmer. Leaves round-reniform or oblate. Calyx-lobes almost triangular, flowers white or tinged with pink. July—1.

MONESES, Salisb. One-flowered Pyrola.

1416. M. UNIFLORA, Gray.

Pyrola uniflora, L.

Peat bogs and low woods. One of our most charming flowers. The leaves are small and close to the ground; from their centre is thrown up one large white pendent flower of great beauty and delicious scent. Dow's Swamp. Kingsmere. Mer Bleu. Casselman. July—1. (B)

CHIMAPHILA, Pursh. Pipsissewa.

1417. C. UMBELLATA, Nutt. (Prince's Pine.)

Dry coniferous woods. Uncommon. This is another plant of great beauty. The evergreen leaves are thick and shining and borne in a whorl, or are slightly scattered along the short stems. Flowers borne in a corymb above the leaves. Petals pink, anthers violet, stigma green.

PTEROSPORA, Nutt. Pine-drops.

1418. P. ANDROMEDEA, Nutt.

Pine woods. This is a very local plant. Along the bank of the Gatineau between Ironsides and Chelsea, upon a heavy clay bank, beneath pines, it is very abundant. With the exception of a single plant found at Rockcliffe by Mr. A. J. Forward, this is the only locality so far discovered in this district. It is a curious plant, consisting of a stout, pinkish-white, erect, clammy-pubescent, fleshy stem about two feet in height, bearing at the base lanceolate scales instead of leaves, and above nodding white flowers like those of *Andromeda*, in a long bracted raceme. Root, a mass of fleshy fibres. It is supposed to be a parasite on the roots of pines.

MONOTROPEÆ.—Pipe-wort Family.

MONOTROPA, L. Pine-sap.

1422. M. UNIFLORA, L. (Indian Pipe.)

Dry woods. Common. June—4. A parasite upon roots of trees. The beautiful white single-flowered alabastar-like stems are thrown up in a cluster from a ball of matted fibrous roots. Flowers nodding, becoming erect as the fruit ripens.

PRIMULACEÆ.—Primrose Family.

TRIENTALIS, L. Chickweed Wintergreen.

1441. T. AMERICANA, Pursh. (Star-flower.)

Low woods. Common. May—2. (B). A delicate beautiful plant.

STEIRONEMA, Raf. Loosestrife.

1443. S. CILIATUM, Raf.

Lysimachia ciliata, L.

River sides and damp thickets. Common. July—1. (B)

LYSIMACHIA, L. Loosestrife.

1447. L. STRICTA. (Racemed Loosestrife.)

Rocky river-sides and damp thickets. Common. July—1. (B)

1449. *L. nummularia*, L. (Moneywort.)

A garden escape. Parliament hill. A pretty trailing perennial with large golden yellow flowers borne singly in the axils of the leaves.

1450. L. THYRSIFLORA, L. (Tufted Loosestrife.)

Naumburgia thyrsiflora, Reich.

Cold wet thickets. Common. May—4. (B)

ANAGALLIS, L. Pimpernel.

1452. *A. arvensis*, L. Shepherd's Weather-glass.)

Introduced. Wheat fields. Uncommon. July—1. A small procumbent plant with bright scarlet flowers, which open in bright weather but quickly close before rain.

———— var. *cerulea*. Benth.

Introduced with canary seed. This form, which is probably introduced from Germany, is more frequent than the type. It is a larger and coarser plant with purplish blue flowers. Aug.—1.

SAMOLUS, L. Water Pimpernel.

1454. S. VALERANDI, L. var. AMERICANUS, Gray.

River side. Rideau River, at the rifle range. Very rare. July—3. A smooth branched herb four to eight inches in height, with alternate entire leaves and small white flowers in racemes. Corolla bell-shaped, 5-cleft, with small processes (sterile filaments) in the sinuses. True stamens on the tube of the corolla, included.

OLEACEÆ.—Olive Family.

FRAXINUS, L. Ash.

1455. F. AMERICANA, L. White Ash.

Rich woods. A fine and valuable tree. Frequently three or four stems from the same root. There is a common variety of this species with the fruit and young shoots purple. The seeds germinate the first spring after sowing.

1456. F. PUBESCENS, Lam. (Red Ash, Rim Ash, River Ash.)

Banks of rivers and lakes. A fine tree with branchlets and petioles velvety downy; seed germinating the first year. May—3. (B.) This species is sometimes difficult to distinguish from the last, the distinguishing characters not always being well marked. It is generally a smaller tree, the pubescence on the petioles and on the branchlets, although it often disappears late in the season on some trees, is always present on the young shoots. The seed is less swollen, and smaller in proportion to the wing of the samara, than in *F. Americana*. In growing several thousands from the seed I notice that *F. Americana* takes a few days longer to germinate, and leafs out a few days later in the spring. With seedlings sown in rows side by side *F. pubescens* has made in two years twice the growth of *F. Americana*.

1460. F. SAMBUCIFOLIA, Lam. (Black Ash, Water Ash.)

Swamps and low ground. May—3. (B.) A smaller tree than 1455 and 1456. Easily distinguished by its fruit, which is winged all round the seed. The seed does not germinate until the second spring after it is sown. The tough stringy wood is largely used for making baskets and fruit boxes.

APOCYNACEÆ.—Dogbane Family.

APOCYNUM, Linn. Dogbane, Indian Hemp, Lesser Milkweed.

1462. A. ANDROSÆMIFOLIUM, Linn. (Spreading Dogbane.)

Rocky woods and fields. Common. June—2. (B.) An interesting perennial. The frequently forking branches bear a profusion of small sweetly-scented open bell-shaped flowers (4 lines broad), from each of which is produced a pair of slender pods from three to four inches in length.

1463. A. CANNABINUM, L. (Indian Hemp.)

Sandy fields and on islands, in lower ground than the last. June—2. (B.) A more erect plant, with smaller white flowers borne in close many-flowered cymes.

ASCLEPIADACEÆ.—Milkweed Family.

ASCLEPIAS, L. Milkweed, Silkweed.

1465. A. INCARNATA, L. (Swamp Milkweed.)

Borders of rivers and lakes. Common. July—1. (B.) A tall handsome plant with rose-purple flowers scented like vanilla, and smooth pods. The fibre in the stem of this plant is very tough and it should make a good fibre plant.

1467. A. CORNUTI, Decaisne. (Milkweed.)

Fields and borders of thickets. Common. July—2. (B.) A handsome and sturdy wayside weed.

GENTIANACEÆ.—Gentian Family.

GENTIANA, L. Gentian.

1497. G. ANDREWSII, Griseb. (Closed Gentian.)

River sides and moist ground. Common. Aug.—2. (B) A very handsome species with deep green glossy foliage, and large bluish-purple flowers, over an inch in length, borne in a terminal cluster and in the axils of the upper leaves.

MENYANTHES, L. Buckbean.

1506. M. TRIFOLIATA, L.

Bogs. Not uncommon. May—3. (B)

POLEMONIACEÆ.—Polemonium Family.

PHLOX, L.

1510. P. DIVARICATA, L. (Blue Phlox.)

Damp woods. Casselman. Rare. Ju.—2. A delicate plant well worthy of cultivation.

HYDROPHYLLACEÆ.—Waterleaf Family.

HYDROPHYLLUM, L. Water Leaf.

1536. H. VIRGINICUM, L.

Damp woods. Casselman. Ju—2. A coarse weedy plant.

BORRAGINACEÆ. Borage Family.

CYNOGLOSSUM, L. Houndstongue.

1549. C. *officinale*, L. (Common Houndstongue Burr.)

Introduced from Europe. Common. Ju—1, (B). A troublesome weed.

1550. C. VIRGINICUM, L. (Blue Comfrey.)

Woods. Rather rare. King's Mountain. Green's Creek (*J. F.*) Britannia (*R. B. Whyte*). Ju—1. A showy plant with delicate blue flowers.

ECHINOSPERMUM. Swartz. Stickseed.

1555. E. VIRGINICUM, Lehm. (Beggar's Lice.)

Cynoglossum Morisoni.

Rich open woods. Common. July—2.

1556. *E. Lappula*, Lehm. (Small Sheep Burr.)

Introduced from Europe. A troublesome weed. Ju—2. (B).

MYOSOTIS, L. Forget-me-not.

1576. *M. laxa*, Lehm.

River side. Billings Bridge. New Edinburgh. Gatineau Point. July—1. A slender plant with small flowers.

LITHOSPERMUM, L. Gromwell.

1581. *L. arvense*, L. (Corn Gromwell.)

Introduced. Occasional with grain, but not persistent. Ju—2.

1582. *L. officinale*, L. (Common Gromwell.)
Introduced and very abundant in rocky pastures. Ju—2. (B).

1585. L. HIRTUM, Lehm. (Hairy Puccoon.)
River side in sand. On the banks of the Ottawa above Aylmer. Rare. (Mrs. Chamberlin) June—3. Flowers bright orange, woolly inside.

SYMPHYTUM, L. Comfrey.

1590. *S. officinale*, L. (Common Comfrey.)
Introduced. Rideau rifle range. Buckingham. Aylmer. July—2.

LYCOPSIS, L. Bugloss.

1591. *L. Arvensis*, L. (Small Bugloss.)
Introduced. Rare in sandy fields. Theodore street and at Billings Bridge. June—2.

ECHIUM, L. Viper's Bugloss.

1592. *E. vulgare*, L. (Blue weed.)
Introduced. Gradually becoming a troublesome weed. Ju—2.

CONVOLVULACEÆ. Bindweed Family.

IPOMÆA, L. Morning Glory.

1594. *I. purpurea*, L. (Common Morning Glory.)
A garden escape, frequently found in waste places.

CONVOLVULUS, L. Bindweed.

1597. C. SPITHAMÆUS, L. (Low Bindweed.)
Calystegia spithamæa, Pursh.
Clay banks, sandy shores, and rocky islands. Rare. Bank of the Ottawa below Rockcliffe. Kettle Island. and formerly on the rocky island opposite the end of Bank street. A very attractive plant with short stems and large pure white flowers. July—1.

1598. *C. sepium*, L. (Bracted Convolvulus. Hedge Bindweed.)
Calystegia sepium, R. Br.
Introduced. Chelsea Road, one locality. July—1. This is evidently the European form, which has in some way got introduced. It climbs up over high bushes fifteen or twenty feet from the ground and has snow-white flowers.

———— var. AMERICANUS, Sims.

River sides, trailing over sand or low plants. Distinguished from the type by the short stems, obtuse bracts and pink flowers. July—1. (B)

1599. *C. arvensis.* (Small Bindweed.)

Introduced. Cummings Bridge. Billings Bridge. Parliament Hill. The original plants here are very persistent, but it does not seem to spread much by seed. July—1.

CUSCUTA, L. Dodder.

1603. C. GRONOVII, Willd.

Low open woods and river sides. Trailing over low plants, particularly *Eupatorium ageratoides.* Not uncommon. July—2. A curious and interesting parasite, having bright orange stems, and, for the genus, large white flowers borne in close clusters at intervals along the stems. The only species of the genus so far detected in this district.

SOLANACEÆ, L.—Nightshade Family.

SOLANUM, L.

1608. *S. nigrum,* L. (Common Nightshade.)

Introduced. Common in low ground. July—1. (B)

1609. *S. Dulcamara,* L. (Bittersweet.)

Introduced. Rare in low woods. Billings Bridge and near the Rideau rifle range. June—2.

1610. *S. rostratum,* Dunal.

Introduced. This is a curious case of persistence. *S. rostratum* is a Colorado plant, and interesting as being in all probability the original food plant of the Colorado potato beetle. It can generally be found every year in some part of the city in waste places, but nowhere in abundance. First noticed by Mr. J. A. Guignard in 1876.

LYCOPERSICUM, Mill. Tomato.

1612. *L. esculentum,* Mill.

Introduced. The tomato in some of its many cultivated forms is always to be found growing on waste heaps and by waysides.

PHYSALIS, L. Ground Cherry.

1613. *P. Peruviana*, L. (Cape Gooseberry.)
Introduced. Waste heaps. Occasionally found, but not persistent. July—4.

1614. P. GRANDIFLORA, Hook.
Rocky woods. Not common. Generally found after woods have been burnt over. June—3. A showy plant with large pure white flowers spotted in the centre with greenish yellow.

1615. *C. pubescens*, L. (Downy Physalis.)
Introduced. Occasionally found on waste heaps. Not persistent. July—1.

NICANDRA, Adans. Apple-of-Peru.

1618. *N. physaloides*, Gærtn.
Introduced. Often found on waste heaps and by roadsides in the city. A fine plant with spreading branches and pretty lavender-blue flowers, which are followed by a large dry berry enclosed in the enlarged calyx-lobes. July—1.

DATURA, L. Thorn-apple.

1620. *D. Stramonium*, L. (Thorn-apple.)
Introduced. Waste pl[illegible]s. A rank-smelling, poisonous and narcotic weed. Not uncommon. Flowers white, followed by large 4-valved prickly pods. July—4. (B)

1621. *D. Tatula, L.* (Jamestown Weed.)
Introduced. Less common than 1620. A taller plant with purple stems and much larger pale violet-purple flowers, emitting a most sickening odour when handled or bruised. July—4.

HYOSCYAMUS, L. Henbane.

1622. *H. niger*, L. (Black Henbane.)
Introduced. July—1. (B.) Not common, but often appearing. A coarse, clammy and strongly scented plant with yellow, purple-veined, flowers.

NICOTIANA, L. Tobacco.

1623. *N. rustica*, L. (Wild Tobacco.)
Introduced. A coarse weed with green flowers.

SCROPHULARIACEÆ.—Fig-wort Family.

VERBASCUM, L. Mullein.

1625. *V. Thapsus*, L. (Common Mullein. Flannel-leaf.)
Introduced. Very common. July—1. (B)

1627. *V. Blattaria*, L. (Moth Mullein.)
Introduced. Rare. Near Cummings Bridge (*R. B. Whyte*), near the St. Louis Dam. Beechwood. There are two forms of this plant—one with yellow flowers, probably identical with the English plant, and a form with larger white flowers tinged with purple. It is probable that this last is an American variety.

LINARIA, Juss. Toad-flax.

1629. *L. vulgaris*, Mill. (Butter and Eggs.)
Introduced. Common. July—1. (B) The flowers vary much in depth of colour, from almost white to orange.

———— var. *Peloria*. This is a rare monstrous state with a regular 5-cleft border to the corolla, 5 spurs and 5 stamens. Plants collected in Metcalfe street produced racemes with every flower of this nature for several years.

CHELONE, L. Turtle-head.

1637. C. GLABRA, L.
In bogs and wet meadows. Common. July—1. (B)

PENTSTEMON, Mitchell. Beard Tongue.

1647. P. PUBESCENS, Solander.
Rocky banks. Rare. Hull. Little Chaudiere. Aylmer. July—1. (B)

MIMULUS, L. Monkey-flower.

1654. *M. ringens*, L.
In ditches and low ground. July—1. (B)

GRATIOLA, L. Hedge Hyssop.

1660. G. VIRGINIANA, L.

Low ground. July—2. (B) A low clammy pubescent plant. Flowers small, whitish, with the tubes yellow.

1661. G. AUREA, Muhl.

Alluvial flats. Rather rare. Malloch's Bay. Billings Bridge. New Edinburgh. A small slender plant growing amongst grasses, etc., with large golden-yellow flowers.

[LYSANTHES, Raf. False Pimpernel.

1662. I. GRATIOLOIDES, Benth. (False Pimpernel.)

On mud by the sides of rivers. July—2. (B) Small smooth annuals, very much branched and growing over the mud. The small purplish flowers produced all the summer.

VERONICA, L. Speedwell.

1667. V. ANAGALLIS, L. (Water Speedwell.)

In water, in ditches and streams. Leaves sessile. Ju.—2.

1668. V. AGRESTIS, Schwein. (American Brooklime.)

Brooks and ditches. July—1. Leaves thick, petioled. Pods swollen.

1669. V. SCUTELLATA, L. (Marsh Speedwell.)

Swamps and marshes. June—2. (B) Stems slender and weak. Leaves linear. Flowers in very slender zig-zag racemes. Pods flat, broader than long.

1671. V. OFFICINALIS, L. (Common Speedwell.)

Sandy woods. Rather rare. Beechwood. Hull. Chelsea. Aylmer. July—1. A pubescent prostrate plant with erect many-flowered racemes of pale, lavender flowers. Pod obovate-triangular, broadly notched.

1675. V. SERPYLLIFOLIA, L. (Thyme-leaved Speedwell.)

Open grassy places. May—3. (B) A prostrate, almost glabrous plant, the branchlets terminating in loose elongated racemes. Pod swollen broader than long.

1676. V. PEREGRINA, L. (Neckweed. Purslane Speedwell.)

Low ground where the water has lain in the spring. Ju.—1. (B) An erect, branched, almost smooth, weedy looking plant with minute flowers.

1677. *V. arvensis*, L. (Corn Speedwell.)

Rocky woods and fields. Ju.—2. Very pubescent, generally erect. Lower leaves petioled, crenate. The form found here has quite a different aspect from the English, which is a diffusely spreading plant with larger flowers and greener leaves.

1678. *V. agrestis*, L. (Field Speedwell.)

Introduced. Occasionally introduced with English grass-seed, but usually dying out after four or five years. Parliament Hill. Major's Hill Park. A pretty prostrate plant with bright blue and white flowers.

GERARDIA, L.

1684. G. PURPUREA, L. var. PAUPERCULA, Gray.

Marshes and on floating logs. Rideau Canal. Along the Ottawa. July—2. A slender branched plant with linear leaves and large funnel-shaped purplish-pink flowers.

PEDICULARIS, L. Lousewort.

1708. P. CANADENSIS, L. (Wood Betony.)

Dry woodlands and sandy fields. May—3. (B) A coarse but attractive plant with pinnately-parted leaves and dense spikes of yellow flowers tinged with rich brown.

MELAMPYRUM, L. Cow-wheat.

1719. M. AMERICANUM, Mx.

Sandy and rocky woods. Lake Windeago (*Dr. H. B. Small*). Rockcliffe. King's Mountain. July—1. Slender branching annuals with opposite leaves, the lower entire, the upper larger and fringed at the base. Flowers yellow, solitary in the axils of the upper leaves.

SUMMARY

—OF—

Canadian Mining Regulations.

NOTICE.

THE following is a summary of the Regulations with respect to the manner of recording claims for *Mineral Lands*, other than Coal Lands, and the conditions governing the purchase of the same.

Any person may explore vacant Dominion Lands not appropriated or reserved by Government for other purposes, and may search therein, either by surface or subterranean prospecting, for mineral deposits, with a view to obtaining a mining location for the same, but no mining location shall be granted until actual discovery has been made of the vein, lode or deposit of mineral or metal within the limits of the location of claim.

A location for mining, except for *Iron* or *Petroleum*, shall not be more than 1500 feet in length, nor more than 600 feet in breadth. A location for mining *Iron* or *Petroleum* shall not exceed 160 acres in area.

On discovering a mineral deposit any person may obtain a mining location, upon marking out his location on the ground, in accordance with the regulations in that behalf, and filing with the Agent of Dominion Lands for the district, within sixty days from discovery, an affidavit in form prescribed by Mining Regulations, and paying at the same time an office fee of five dollars, which will entitle the person so recording his claim to enter into possession of the location applied for.

At any time before the expiration of five years from the date of recording his claim, the claimant may, upon filing proof with the Local Agent that he has expended $500.00 in actual mining operations on the claim, by paying to the Local Agent therefor $5 per acre cash and a further sum of $50 to cover the cost of survey, obtain a patent for said claim as provided in the said Mining Regulations.

Copies of the Regulations may be obtained upon application to the Department of the Interior.

A. M. BURGESS,
Deputy of the Minister of the Interior.

DEPARTMENT OF THE INTERIOR,
Ottawa, Canada, December 19th, 1887.

Statutes of Canada

—AND—

OFFICIAL PUBLICATIONS.

The Statutes and some of the Publications of the Government of Canada, are for sale at this office. Also separate Acts. Revised Statutes: price for 2 Vols. $5.00, and for supplementary volume $2.50. Price List sent on application.

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Department of Public Printing and Stationery.
Ottawa, February, 1880.