

anticipation of a prosperous future for this part of the Province. Pictou Coal is now practically used with success for iron smelting, and is within four miles of some of the deposits, and is carried across the iron district by the Pictou branch of the Intercolonial Railway.

We must now regard Pictou County as possessing in abundance those gifts of nature, which, when properly combined are the foundation stones of empires. The future of Nova Scotia is limited and easily foreseen as long as we continue the present system of selling our raw material for bread. When we assume the position intended for us by nature, and manufacture and work up the treasures of the rocks, we enter upon a boundless career.

NOTE.—Hand specimens of the samples collected for the Philadelphia Exhibition, were shown by the writer, to illustrate the paper.

ART. V.—THE INDIGENOUS FERNS OF NOVA SCOTIA. BY
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(Read before the Institute, April 24, 1876.)

AMONGST the different branches of the study of Nature, none perhaps is more charming and edifying than Botany. It gives a wholesome and pure delight to those who have taste for it. And so generally inherent is this taste, that the botanist, or aspirant botanist, will usually find his own enthusiasm quite catching by the circle of friends amongst whom he moves, if he will only demonstrate it a little. And thus he will see that it only needs a greater active interest to be taken, in order to awaken the same in others; and by so doing promote the science, and give a pleasure, as truly *sui-generis*, as it is gratifying and lasting.

From its necessary tendency to call for walks and rambles into the country, in the woods and open fields, Botany is essentially a healthful study; and from the ardour with which it inspires its student, it gives an untiring interest. Everything green speaks to

the botanist. Flora, if I may be allowed the personification, is a companion that is ever by his side; and if but an attentive ear be turned towards much that she has to impart—for she is a holy hand-maiden—she will teach (as the lilies of the field are being considered) that “the works of the Lord are great, *sought out of all them that have pleasure therein.*”—Ps. cxi. 2. But many shrink from this delightful study by the Latin nomenclature which is necessarily adopted, and by the broad scope which the science takes. I confess the influence of this upon myself, but the circumstances of little spare time, and the being in a neighbourhood rich in ferns (*) induced me to take up one of the branches, Native Filices, as a specialty.

From the comparative simplicity of their structure when compared with that of phænogams or flowering plants, Ferns, which belong to the second series, (the cryptogams or flowerless plants), require much less study to understand them. And from the fact that here in Nova Scotia at least, and generally in the north temperate zone, the proportion of ferns to the phænogams is not perhaps more than 1 to 20, this branch of the study is of much narrower scope: whilst with such facility for study as is given in the opening chapters of Moore’s shilling edition of British Ferns, the science of Pteridology is easily mastered.

And well indeed does the pleasure of seeking for, finding, and examining the rarer species and varieties repay the trouble of mastering the technical terms by which the plants are described. Some mental application to this point is absolutely necessary; and without spending some pains in this, the pleasing conviction will never be gained of how almost perfect is Botany as a science of description.

The Indigenous Ferns are graceful in habit of growth, they give charm to the landscape and have peculiarities of beauty and elegance which do not belong to flowering plants. Who has failed to notice the exquisite beauty of light and shade which towards sun-set characterize the small hillocks of *Dicksonia punctilobula* so

(*) Canterbury, Kent, England.

common generally along our road sides : how that the boldest dark shade is seen side by side with suddenly and almost imperceptibly blended lights, which, to an almost transparent whitish green, touch up the tips of the tufts when Sol's rays are nearly horizontal ! I say Who has not ? and yet I must own that to admire nature and to thoroughly appreciate its beauties, is as truly a matter of education as it is to become proficient in mathematics. But no one can fail to see that the foregrounds in our landscapes derive many of their charms from the presence of ferns. And in many instances this is so with the distance as well, where, as is not unfrequently the case, the brightly tinted light green of the *Osmunda Claytoniana* adds a pleasing feature to many a moistened hillside. Amongst other ferny delights, but to be rarely met with in Nova Scotia, may be mentioned the beautiful symmetrical growth of the *Struthiopteris Germanica*, with its fronds all of equal size arranged in a perfect circle, sufficiently stiff and perpendicular to enable the plant to make a bold stand, and yet plumosely graceful so as to give it elegance, and tall enough to make it necessary to seek the kind friendship of a close neighbouring log or boulder, that by mounting you may get the best view, almost directly downward, of this beautiful plant.

With these introductory remarks I will proceed to give a list of such of the Nova Scotia ferns, as have up to this date (*) been found, making such notices as may dictate themselves, but taking some care not to repeat again what has already been published by Dr. Asa Gray in his Manual, and by Dr. Lawson in his Synopsis of Canadian Ferns. This latter work was published before the days of Confederation, and consequently does not touch upon Nova Scotia Ferns specially.

Ferns are the "Order Filices", belonging to the Class Acrogens, and to the Second Series, which consists of the Cryptogams or Flowerless Plants. Up to the present time as many as 31 genera have been discovered as Indigenous.

(*) April, 1876.

SUB-ORDER. POLYPODIACEÆ.

Tribe I. *Polypodiææ*.

Polypodium vulgare. (Lin.) This is commonly known as the rock-fern, a name which its habitats fully authorize: for it is uncertain if it has ever been found growing elsewhere than on rocks. I once thought I had found an exception; but upon removing the thin coating of mould in which it grew, *there*, sure enough, were the rocks. From this peculiarity, and from its much smaller size than the British species (which grows under hedges and on banks), our indigenous *P. Vulgare* is looked upon as a variety by Hooker, and called *Americanum*. It is of very general distribution throughout the Province, abounding on shaded rocks and boulders. It is an evergreen.

Tribe II. PTERIDEÆ.

Adiantum pedatum. (Lin.) This plant is the pride of indigenous Fernists, and is our only representative of the Maiden-hairs. Its only known habitat in this Province at present is Newport, Hants Cy., where it was first found by Mrs. Bennet. It can be seen growing at Mr. Harris' Gardens. There is scarcely one of the world-wide spread species of *Adiantum* which can be preferred before it, the only regret being that it is not an evergreen.

Pteris aquilina. (Lin.) The common brake is widely distributed over the world. Common and hardy though it appears to be it is the only indigenous species which seems to defy all efforts to transplant it either into an artificial fernery, or for pot culture. The nearest successful attempt which can perhaps be made is to dig up very carefully some of the soil in spring where the old fronds mark its habitat, and then being careful having once potted it or placed it in the fernery not to again move it.

Tribe III. ASPLENIEÆ.

Woodwardia Virginica. (Smith.) This one only indigenous representative of the Woodwardias is evidently quite rare in the Province, having as yet been found only in two habitats, on other side of N. W. Arm opposite the penitentiary, in a swamp; and at Dartmouth, (latter hab. Mr. Harris, Jr.)

Asplenium trichomanes. (Lin.) This evergreen, rare, and graceful little fern which retreats to sheltered nooks in the rocks, if it be kept for pot culture is indeed a pet to be admired and cared for, and well worthy of the special favour of an ornamental glass shade, by which means alone can it be successfully coaxed to live and grow away from its native birthplace. For a constantly moist atmosphere is essential to its existence.

Habs.—Hartley water-fall, Pirate harbour, Strait of Canso, 1869; and rocks on banks of Gold River, near Chester, Lunenburg, 1875, (last 2 Rev. E. H. Ball); near Three Mile House, Halifax, (John Sommers, M. D.)

Asplenium thelypteroides. (Michaux.) Rather rare, being only scarce even where local, though widely distributed over the province. Though not remarkable for elegance of growth, the fronds have a rich dark green colour which is well preserved in an herbarium.

Habitats—Windsor, (Professor How, D.C.L.) Halifax (A. W. D. Lindsay, M. D.,) (Professor Sommers, M. D.); Pt. Dalhousie (Prof. McKay, B. A.,); Port Mulgrave commons high up, and by a brook-side, Strait of Canso; Broad Cove fall, and Atwater's, fall, Boylston, Guysboro County; by a brook near the church, Rawdon, Hants County; (last 4 habs. Rev. E. H. Ball.)

Asplenium filix-fœmina. (Bernhardi.) Quite common and widely distributed throughout the province.

Tribe V. ASPIDIÆ.

Phegopteris polypodioides. (Fée.) It is rather to be regretted that Dr. Gray has not given this fern its more usual name, which is *Polypodium phegopteris*, in agreement with Moore and Dr. Lawson. This fern also is common and very generally distributed.

Phegopteris dryopteris. (Fée.) This too is usually grouped with the genus *Polypodium*. Not one of the commonest of our ferns though very generally distributed and to be met with in most localities. Being small it can best be found in the spring when its delicate and bright green colour renders it conspicuous, before it has become dull and hidden by ranker vegetation.

Aspidium thelypteris. (Swartz.) Perhaps the least elegant of all the Indigenous Ferns. Quite common in swamps.

Aspidium Nov-Eboracense. (Swartz.) One of the most delicately tinted of all our ferns, retaining throughout maturity a very light green colour which makes it valuable in an artificial fernery from the contrast which it makes with other dark greens. Common in swamps and moist places.

Aspidium fragrans. (Swartz.) Perhaps the most rare of Nova Scotia Ferns, as only one habitat, Hartley water-fall, Pirate Harbour, Strait of Canso (Rev. E. H. Ball,) is as yet known for it and where it is quite scarce. Its existence in Canada is queried in Dr. Lawson's Synopsis, 1864. I was fortunate enough to find this fern in October, 1869; a very fine root of it (the fronds 10 inches long) which I procured in 1874, literally perfumed the room in which it was kept with sweetest fragrance. But my prize went the way of so many pets, and was killed with care and kindness; for it is very hardy and should have been kept out-of-doors. It grows on the spot above mentioned, on the face of a perpendicular rock, which is upwards of sixty feet high. Pteridologists who may visit this most charming and interesting nook where nature draws curtains around and over the rock which bears (in *their* eyes) at least *three* precious treasures (including *Aspl. trich.*, and *Cystop. Bulbifera*), must please bespeak the assistance of some such cicerone as an opera glass or pocket telescope, if they would wish to descry this rare species. And with that they must be content: for it is beyond reach. Still it can but afford them true satisfaction in another way, in the fact that there it is reverently kept from rude hands and uninitiated minds who know not the sacredness with which a botanist regards the one, perhaps only habitat of a valued species. The fragrance of this fern can perhaps be best compared to that of mignonette, but it is milder, being without that unpleasantness which arises from the latter when in close proximity. A microscopic examination of the reniform indusium of this fern, at least when young, fringed as it is all round with glands, is a rich treat.

Aspidium spinulosum. (Swartz.) Only varieties of Gray's typical *Aspid. spin.* are to be found in Nova Scotia. But

we have at least five varieties, though I would wish to insert a query after this statement as being doubtful of their constancy. But as we find them abroad in their natural habitats there can be no doubt about this.

Var. *intermedium*. This is well described in Gray's Manual, and is to be commonly met with about Halifax, and in Guysboro Co., and in fact all over the province.

Var. *dilatatum*. Native plants of this variety differ from the British *Lastrea dilatata* specially, and from the United States variety less so, in that it has scarcely any deeper brown in the centre of the scales than at the margin, for in Nova Scotia plants the variety *intermedium* has the darkest scales and fronds. *Dilatatum* is known from *intermedium* by its broader, more drooping and lighter coloured frond and lighter scales, as well as from its peculiarity in the early autumn of being mottled with spots as though decaying.*

It is more generally constant than the latter variety in having the pinnæ markedly broader near their centres than at their bases, (except in the basal pinnæ) whilst too, the rhizome is several times larger than that of the equally aged *intermedium* (side by side with which it frequently grows), being creeping also where *intermedium* is upright, and having the further additional distinction of shooting off young rhizomes from the parent one.

Var. *dilatatum*. Habs. Atwater's fall, Boylston; ravine near mouth of brook that runs under road between residence of S. Hart, Esq., J. P., and Boylston School house, Guysboro County; along road between Margaret's Bay, and Hubbard's Cove, Lunenburg County; (Rev. E. H. Ball). It is rather common.

Var. *obliquum*. Very nearly approaches Gray's typical *Aspidium spinulosum*, but differs in having more plentiful supply of scales which are *not deciduous*. The oblique setting of pinnæ and pinnules, more upright growth and the *distinctly elongated triangular form of all the pinnæ* (not merely the basal ones) are points which distinguish this from the two foregoing varieties.

* The indusium is smooth and without glands, whilst in var. *intermedium* it is irregularly notched and glanduliferous.

Hab. Along main road from Margaret's Bay to Mahone Bay. (Rev. E. H. Ball.)

Var. *recurvatum*. This variety is recognized by Moore, but not named. It is very readily distinguished from the forementioned varieties by the recurved, convex growth of the frond, the pinnæ and pinnules.

Var. *recurvatum*. It is frequently tinged with a brownish colour, and is found in exposed places. Habs.—Woods of Mr. Frank Marshall, Boylston, Guysboro County; road between Blockhouse and Maitland, Lunenburg County; the Parade, Mahone Bay, Lunenburg County. (Rev. E. H. Ball.)

Var. *dumetorum*. This variety is chiefly characterized by its dwarfish size. The fronds are less than 12 inches long, but abundant in fruit, and when young glandulous all over from stripe to apex, both on the upper and under surfaces. The indusium is specially glandulous. The glands disappear from the face of the frond first, remaining longest on the rachis and sub-rachis, the back of the mid-veins and on the indusium. Habitat, near Bedford, where it has been found by Peter Jack, Esq. These varieties are all evergreen.

Aspidium cristatum. (Swartz.) A common well known swamp fern, though frequently found growing in much dryer spots.

Aspidium filix-mas. (Swartz.) This fine fern so common in Great Britain is but very rare in America. It has recently been discovered by A. W. H. Lindsay, M. D., at Whycocomah, Cape Breton. It is described in Gray's Manual. In Dr. Lawson's Synopsis there is a double query put against its existence in Canada, so that our neighbouring Island may be proud of having this rare species of our Indigenous Ferns.

Aspidium marginale. (Swartz.) This fern is very generally distributed throughout the province, and is to be met with on most rocky banks. It is specially abundant and of fine growth on Pomquet Island, off Bayfield, Antigonishe County. As an indoor winter evergreen it is much to be prized.

Aspidium acrostichoides. (Swartz.) This fine evergreen fern is to be found in all our forests of hardwood and elsewhere, being quite

common. One specimen of this fern found at Rawdon (Rev. E. H. Ball) had between 12 and 20 pinnæ on each frond bifurcated.

Aspidium aculeatum, var. *Braunii*. (Rock.) One of our choicest evergreens. It is of very graceful form and very hardy. But it is rare even where local in Nova Scotia. Its known habitats are Marble Mountain, Bras d'Or Lake, (Prof. How, D.C.L., 18) Sherman's Mountain, Port Mulgrave, Strait of Canso; Ehler's water-fall, near Guysborough, (Rev. E. H. Ball, 1867), at the latter habitat it is not 20 feet above sea level, though growing high up the ravine, also Hills above Mabou, C. B.

Cystopteris bulbifera. (Bernh.) Perhaps the most delicate as well as at least one of the most rare of our indigenous ferns. The only known habitat for it at present is the famous rock already spoken of in connexion with aspid. fragrans and aspl. trichomanes, where it grows most luxuriantly within the spray of the little fall. Some of the fronds are upwards of three feet in length. Gray's Manual speaks of it as common in the Northern U. S., and Dr. Lawson's Synopsis gives a good number of habitats for Canada West.

Cystopteris fragilis. (Bernh.) Also a delicate fern; generally distributed through the province, though not common. It is to be found on rocky river-banks and in shaded ravines. Habs.—Springville and West River, (Prof. McKay, B. A.), Clam Harbour River, near the bridge; Broad Cove fall, Ehler's fall, Atwater's fall, last 4 habs. near Guysborough. (Rev. E. H. Ball).

Struthiopteris Germanica. (Willd.) Already referred to in the introduction. Not common in Nova Scotia. Habs. Pictou, (Prof. McKay, B. A.); home field of Styles Hart, Esq., J. P., near Guysborough; head of mill pond, between Waterville and Falmouth, Hants County; side of old corduroy road, between Windsor and Brooklyn, Hants Co.; brook-side, near the Church at Rawdon, Hants Co.; (last 4 habs. Rev. E. H. Ball.)

Onoclea Sensibilis. (Lin.) Quite common in swamps and wet places, and to be ranked amongst the delicate looking ferns of our province.

Woodsia obtusa. (Torr.) One of our rarest ferns, the only

habitat as yet known for it being the Windsor Falls. (Prof. How, D. C. L.)

Woodsia Ilvensis. (R. Brown.) Interesting when placed in a growing collection of Indigenous Ferns, from the contrast which its dull green makes with the brighter green of other species. Habs.—Wycocomah, Cape Breton, (A. W. H. Lindsay, M. D.); rocks on banks of Gold River, near Chester, where it is very abundant. Rev. E. H. Ball.)

Tribe V. DAVALLIÆ.

Dicksonia punctilobula. (Kenuze.) Interesting as the only indigenous representative of this genus, and as having a pleasant perfume, which is quite perceptible as the plant approaches maturity. Very common.

SUB-ORDER III. OSMUNDACEÆ.

Osmunda regalis. (Lin.) This large and beautiful fern is also common, delighting to grow in running water, its roots being often quite submerged; but it also abounds in swamps and other moist places.

Osmunda claytoniana. (Lin.) The specific name *interrupta* very aptly describes this most beautiful fern which is quite common. Its glory is but short-lived however; for at the end of June the decayed shrivelled appearance of the fruitful portions of its fronds makes it as disappointing as it is up to that time pleasing. Quite common in moist places.

Osmunda cinnamomea. (Lin.) A little earlier in springing than *claytoniana*, and specially to be admired for its reddish brown upright, central, fruitful fronds. But here too, the fruitful fronds soon decay. Very common in swamps and wet places.

O. C. var. frondosa. Found by Prof. How, D. C. L., near Windsor, whose specimen is in the Herbarium of Halifax Museum.

SUB-ORDER IV. OPHIOGLOSSACEÆ.

Botrychium simplex. (Hitchcock.) In the earlier editions of Gray's Manual this is given as a variety of *Botr. virginicum*, but in later editions as a distinct species, and apparently very correctly

so, for two fronds could scarcely be more distinct than are the very simple barren segment of this fern and the extremely pretty highly decomposed segment of *Viriginicum*. It is very rare in this province, having been found only by Prof. How, D. C. L., of Windsor.

Botrychium Viriginicum. (Swartz.) This fern is also rare and is the finest species of *Botrychium*. It is highly compound in its divisions, the barren segment being sub-quatrepinnate. As yet only two habitats for it have been made known, Pictou (Prof. McKay, B. A.); and back of lower part of Port Mulgrave commons, Strait of Canso. (Rev. E. H. Ball.)

Botrychium lunarioides. (Swartz.) By no means an ostentatious looking fern, being the smallest of our Indigenous species, The barren segment is evergreen. It is not uncommon, though from its being generally found in old pastures, from its dull green colour and dwarf nature it is apt to escape observation. On this account some habitats are here given. Lower and cultivated parts of Cape Porcupine; in woods near Clam Harbour bridge, and along road thence to the Guysboro River; Field at Head of Broad Cove, Boylston, Guysboro Co.; along road from Cornwall to New Germany, Lunenburg Co.; low narrow marsh on outskirts of town, near Holy Trinity Church, Bridgewater; Oakland's Lake, Mahone Bay, Lunenburg Co.; very common in churchyard and adjoining lands, Rawdon, Hants Co. (All these habitats Rev. E. H. Ball.)

B. L. var. obliquum. (Botr. *obliquum*, Muhlenberg.) Differs from typical plant in being much larger, the sterile segment being about three times the size and tri-pinnate instead of only bi-pinnate. Habs.: New Germany along roadside from Barss' Corner to the Lahave; and Oakland's Lake, Mahone Bay. (Rev. E. H. Ball.) In the latter habitat I found a specimen with the barren segment having two fruitful segments growing from it low down near its connexion with the principal fruitful segment. Gray's Manual records the finding of a specimen of the typical plant somewhat akin to this.

Var. *dissectum*. (Botr. *dissectum*, Muhl.) A very interesting and distinct variety, about the size of *obliquum* but having the

pinnules laciniately divided into narrow teeth. Habs.—Mt. Uniacke, (Rev. J. B. Uniacke); New Germany, roadside between Barss' Corner and the LaHave, Lunenburg Co., (Rev. E. H. Ball.) The two varieties seem to be rare.

ART. VI.—THE SEMI DAILY FLUCTUATION OF THE BAROMETER.
BY FREDERICK ALLISON.

(*Read before the Institute, May 8th, 1876.*)

BEFORE proceeding to an investigation of this phenomenon—well known to observers—I wish to offer a few remarks upon the weather of last year, a summary of which you have in the General Register before you.

In 1875 we had a cool year—the coldest at least since 1859, if not for a longer period. The normal temperature in Halifax is $42^{\circ}.66$. This year was $40^{\circ}.23$. We may notice here the very small difference in yearly mean heat. However great may be the ranges in the twelve months—last year they extended over 99° and sometimes they reach 104° , as in 1866—so well balanced are the several months and seasons that $4^{\circ}.27$ will cover the means of the last 16 years. August was the only month which ran above its normal, and was much the hottest month of the year. The maximum heat also occurred in this month 85° . Many months were cold, but January was excessively so; its mean $14^{\circ}.99$ being $7^{\circ}.7$ below its normal, and this was the coldest month I ever experienced in Nova Scotia. February—mean $17^{\circ}.99$ was also very cold; and then we touched the minimum— 14° . The 15th of August was the warmest day; and the day exactly six months earlier, the 15th of February was the coldest. The 3rd of June was a very remarkable day in temperature. At 4 a. m., the thermometer was $34^{\circ}.5$ and before noon had mounted to $72^{\circ}.8$ —giving the enormous range of $38^{\circ}.3$ within 8 hours. The pressure was a little more than usual, slightly exceeding the normal in every month, but especially in August. The maximum was on the 23rd