

although comparatively recent, are still doubtless of high antiquity, and were probably the haunts of the mastodon and his confreres, as the deposits are doubtless coeval with the interval of Middle river, Cape Breton, which produced, upwards of thirty years ago, the thigh bone of *Mastodon Ohioticus*, now in the Provincial museum, and the flats of Baddeck, C. B., in which was found about seven years ago, the tooth of *Mastodon Ohioticus*, now in my own collection. It is the confidently expressed opinion of intelligent inhabitants who have been in the habit of observing landmarks for upwards of half a century, that the land is slowly subsiding. I have not yet ascertained precisely the grounds upon which this opinion rests. This point and others already indicated, may be the subject of notes on a future occasion.

ART. XII. NOVA SCOTIAN CONIFERS. BY COLONEL HARDY;
PART I.

[*Read May 3, 1866.*]

A GLANCE at a physical map of North America, will shew how the great prairies, extending diagonally through the continent, from the Gulf of Mexico to the shores of the great Slave Lake in the North-West, at this latter point appear to divide into two streams the evergreen forest, here composed solely of coniferæ, which forms a broad and continuous belt from the eastern shores of Labrador to the Pacific.

These fir forests in their northern extension, ever growing more stunted, gloomy and monotonous, at last merge into the treeless and snow-covered barren, where the small Arctic cariboo and musk ox obtain a scanty living on the lichens of the rocks, and grass-tufts of the valleys. Their character is sombre in the extreme; their growth and appearance indicate the severity and hardships of the climate; the twisted trunk, the bare and bent top, and the profuseness of the moss-beards clinging to the limbs of the spruce and scrub pine, the almost exclusive trees of the region, shew how slow has been their growth, and with what difficulty it has been attained. Dr. Richardson states that, on the borders of the Great Slave Lake,

four hundred years are required to bring the stem of the white spruce to the thickness of a man's wrist.

Leaving these desolate scenes, and tracing the influence of decreasing latitude and more genial climate upon the great belt of coniferæ where, skirting the prairies, it enters the lake districts of Canada, we find that at about the neighbourhood of Lake Winnipeg the forest is diversified by the accession of several species of deciduous trees, the elm and the ash; further south, by the various descriptions of maples, oaks, and beeches; and, at length, by the shores of Superior, the character of the Canadian forest becomes fully developed, exhibiting that beautiful admixture of deciduous trees with the various pines and spruces, which constitutes its picturesque grandeur.

Embracing the Canadian Lakes and the shores of the St. Lawrence, this woodland district stretches away to the Atlantic seaboard, and covers the provinces of New Brunswick, Nova Scotia, and Prince Edward Island, including a large portion of the Northern States. This large tract of forest has been termed by Dr. Cooper in his admirable monograph on the North American forest-trees, the Lacustrian Province, from the number of its great lakes, and is chiefly characterized by the predominance of evergreen coniferæ.

The consideration of this family, extending over so large a portion of our North American colonies, involves many subjects of great importance as to the physical aspects and climate of the country, the influence of its forests on rainfall and springs, on the vegetation and on the health of its inhabitants, which cannot be discussed this evening. Nor can we notice, more than briefly, another interesting topic in connection with our subject—the extreme geological antiquity represented by the fir-tree. Hugh Miller states, that he found a fossil of coniferous lignite in the Lower Old Red Sandstone, and that Pine forests existed, and there was dry land, where it had been previously thought that all was covered by the ocean.

Conifers formed a leading feature of the coal formation; and, though all the ancient species, up to the Post Tertiary period, have perished, the type is still continued in all its low state of organization.

The animals characterizing the North American fir forest are all, likewise, of most ancient type; especially the musk ox, the

reindeer and the moose, whose ancestors have doubtless lived contemporaries with the mammoth in the earlier period of the Post Tertiary.—“America” says Hugh Miller, “though emphatically the New World in relation to its discovery by civilized man, is, at least in these regions, an old world in relation to geological type, and it is the so called old world that is in reality the new one.

A. Nigra (*Poir*), BLACK SPRUCE, DOUBLE SPRUCE.

Leaves short ($\frac{1}{2}$ in. by $\frac{2}{3}$ in. long) rigid, dark green; cones ovate or ovate oblong (1— $1\frac{1}{2}$ in. long) the scale with a thin and wavy eroded edge. *A. rubra*, a northern form.

The Black Spruce is one of the most conspicuous and characteristic forest trees of North Eastern America, forming a large portion of the coniferous forest growth and found in almost every variety of circumstance. Sometimes it appears in mixed woods of beautiful growth, of great height and its numerous branches drooping in graceful curves from its apex towards the ground, which they sometimes sweep to a distance of twenty to thirty feet from the stem, the summit terminating in a dense arrow head, on the short sprays of which are crowded heavy masses of cones. At others it is found almost the sole growth, covering large tracts of country, the trees standing thick with straight clean stems and but little foliage except at the summit. Then there is the black spruce swamp where the tree shows by its contortions, unhealthy foliage and stem and limbs shaggy with usnea, the hardships of its existence. Again on the open bog* grows the black spruce, scarcely higher than a cabbage sprout—the light olive green foliage living alone on the compressed summit, whilst the grey dead twigs below are crowded with pendulous moss; yet even here, amidst the cold sphagnum, Indian cups, and cotton grass, the tree lives to an age which would have given it a proud position in the dry forest.† Lastly in the fissure of a

*The Black Spruce assumes a singular appearance in these swamps. The tree, seldom exceeding 30 feet in height, throws out its arms in the most tortuous shapes, suddenly terminating in a dense mass of innumerable branchlets of a rounded contour like a beehive, displaying short, thick, light green foliage. The summit of the tree generally terminates in another bunch. The stem and arms are profusely covered with lichens and usnea.

†Indeed these groves of miniature trees in bogs where the sphagnum perpetually bathes their roots with chilling moisture, have a very similar appearance to Brussels sprouts on a large scale. The water held in the moss is always cold: on May 5th, 1866, the tussocks of sphagnum were frozen solidly within two or three

granite boulder is to be seen its hardy seedling, and the little plant has a far better chance of becoming a tree than its brother in the swamp; for one day, as frost and increasing soil open the fissure, its roots will creep out and fasten on the earth beneath.

As a valuable timber tree the Black Spruce ranks next to the Pine, attaining a height of 70 to 100 or even 150 feet, it forms excellent material, strong and elastic, for spars and yards of vessels, and is converted into all descriptions of sawed lumber—deals, boards, and scantlings. From the young sprays of the Black Spruce is prepared the decoction, fermented with molasses, which is the celebrated spruce beer of the American settler, a cask of which is always kept by the good farmer's wife in the hot, thirsty days of haymaking.* To the Indian, the roots of this tree which shoot out under the moss to a great distance, are his rope, string and thread: with them he ties his bundle, fastens the birch-bark coverings to the poles of his wigwam, or sews the broad sheets of the same material over the ashen ribs of his canoe.

As an ornamental tree in the open and cultivated glebe, the Black Spruce is very appropriate: the numerous and gracefully curved branches, the regular and acute cone shape of the mass, the clear purplish-grey stem and the beautiful bloom which the abundant cones assume in June, all enhance the picturesqueness of a tree which is long-lived, and, moreover, never outgrows its ornamental appearance unless confined in dense woodland groves.

The bark of the Black Spruce is scaly, of various shades of purplish-grey, sometimes approaching to a reddish hue, hence doubtless, suggesting a variety under the name of Red Spruce, which is in reality a form depending on situation. In the latter, the foliage being frequently of a lighter tinge of green, strengthens the supposition. No specific differences have, however, been detected between the trees.

inches of the surface. The centre of these bogs, often called cariboo bogs by reason of this deer frequenting them in search of the lichen, *cladonia rangiferinus* is generally quite bare of spruce clumps, which fringe the edge of the surrounding for the trees increasing in height as they recede from the open bog.

* Essence of spruce is obtained by evaporating the decoction of young shoots in water mixed with sugar and molasses, to the consistence of honey.

A. alba, Mich. (White Spruce.)

The White Spruce, or Sea Spruce of the Indians, is, as has been already stated, a conifer of an essentially boreal character. Indeed in its extension into our own woodlands it appears to prefer bleak and exposed situations. It thrives on our rugged Atlantic shores, and grows on exposed and brine-washed sands where no other vegetation appears, and hence is very useful, both as a shelter to the land, and as holding it against the encroachment of the sea. Its dark glaucous foliage assumes an almost impenetrable aspect under these circumstances. On the sandy shores near the entrance of Musquodoboit harbour there is a grove of White Spruce, which, constantly exposed to S. W. gales, have become so compressed and flattened at the tops, which lean inland from the sea at scarcely ten feet elevation, that a man can easily walk over them as on a platform, and the shelter beneath is complete.*

The Balsam Fir growing in these situations assumes a very similar appearance in the density and colour of its foliage and trunk to the White Spruce, from which, however, it can be quickly distinguished, on inspection, by the pustules on the bark and its erect cones. In the forest the White Spruce is rare in comparison with the Black, whose place it however altogether usurps on the sand hills bordering the limit of vegetation in the far north-west. The former tree prefers humid and rocky woods. The timber is used in framework. I know of no peculiar properties of this tree in an economical point of view, except, that the Indians affirm that the inner bark or *liber* is useful to chew as a demulcent in the case of colds.

GENERAL DESCRIPTION.—Leaves pale or glaucous; cones cylindrical, about 2 inches long, the scales with an entire edge. Leaves $\frac{1}{2}$ to $\frac{3}{4}$ inch in length placed on all sides of the branches. The cones are first of all light green, afterwards tinged with pink, and on ripening change to a very pale brown.

A. Canadensis, Mich. (HEMLOCK SPRUCE.)

Leaves linear, flat, obtuse $\frac{1}{2}$ inch long; cones oval, of few scales, little larger than the leaves, $\frac{3}{4}$ inch long.

The Hemlock Spruce has a wide range in the coniferous woodlands of North America, extending from the Hudson Bay territory to the mountains of Georgia. This great southerly extension of the

* The White Spruce is in frequent groves on the slopes of Point Pleasant. There are some trees of this species nearly 60 feet in height on McNab's Island.

northern forms of trees on the south-east coast, is due to the direction of the Alleghanian range, which, commencing in our own Province of vegetation, carries its flora as far south as 35° north latitude, elevation affording the same conditions of growth as distance from the equator.

The Hemlock is found as a common tree throughout Nova Scotia, loving rich mossy hill sides in the neighbourhood of lakes, though generally mixing with other evergreens in all situations. It is found, however, of heaviest growth (70–100 feet), and in large groves, principally in the former situation, and here vies with the White Pine in the gigantic proportion of its trunk, which grows like a mosaic column, throwing out its first branches gnarled and contorted at a height of 60 feet from the ground. The foliage is light and feathery, resembling that of the yew, and in the old forest tree clings round the summit above in dense masses, from which protrude the twisted limb by which the column is abruptly terminated.

Perched high up in its branches may often be seen, in winter time, the sluggish porcupine, whose presence aloft is first detected by the keen eye of the Indian through the scratches of its claws on the trunk, in ascending its favourite tree to feed on the bark and leaves of the younger shoots.

Large groves of Hemlock growing together in the sloping wood-side present a noble appearance; their tall straight stems resemble the pillars in the aisle of an old abbey; the ground beneath is generally free from undergrowth, and deeply covered with a soft carpeting of moss, and affords great ease to the foot-sore hunter. One can see far through the far shady grove of giants, and the softened light, entering through the thick foliage above, gives an air of pleasing mystery to the interior of these vast forest cathedrals.

The timber of the Hemlock is lightly appreciated for building purposes, being brittle and shakey, and coarse-grained. It is used extensively for wharf and fence posts, being able to resist the action of water a long time, and also has come into demand for railway sleepers. The late Dr. Gesner states, that granaries and grain bins made of Hemlock are not attacked by mice. The bark, which possesses highly astringent properties, is much used in America for tanning, almost entirely superseding that of the oak. It is very

scaly, and, though light grey outside, shews a rich red-brown tint when chipped. The sojourner in the woods seeks the dry and easily detached bark which clings to an old dead Hemlock, as a great auxiliary to his stock of fuel for the camp-fire; it burns readily, long, and emits an intense heat; and so fond are the old Indians of sitting round a small conical pile of the ignited bark in their wigwams, that it bears in their language the sobriquet of “the old Grannie”.

The Hemlock, as a shrub, is perhaps the most ornamental of all the North American evergreens. It has none of that tight, stiff, old-fashioned appearance so generally seen in other spruces: the graceful foliage droops loosely and irregularly, hiding the stem, and, when each spray is tipped with the new season’s shoot of the brightest sea-green imaginable, the appearance is very beautiful. The young cones are likewise of a delicate green.

The spray of the Hemlock is often used by the woodsman in hard times as a decoction in water in lieu of tea, as also is the ground Hemlock. The bark is very ornamental for decorating garden flower baskets in a rustic style.

A. balsamea—*Marshall*—(BALSAM FIR). CANADA BALSAM OR
BALM OF GILEAD FIR,

Leaves narrowly linear; cones cylindrical, large, violet-coloured; the bracts obovate, serrulate, tipped with abrupt and slender point, slightly projecting upwards. Leaves 1 in. or less in length, narrower and lighter-green than those of European or Silver Fir. Cones 3 to 4 in. long, 1 in. broad, the scale very broad and rounded.

So very similar is the American species to the Silver Fir (*Picea*) of Europe, that, when visiting England, I have had to search the stem for the characteristic pustules of balsam, found on our fir, before assuring myself of the difference. The general appearance of the trees is very analogous: the same silvery lines on each side of the midrib under the leaf, which glistening in the sun as the branches are blown upwards by the wind, gives the tree its name. The leaves, however, of the American species are neither so broad nor so dark in colour as those of *Picea*. Dr. Cooper assigns the range of the Silver Fir, N.E. S.W, between the Labrador and the mountains of Penn. It inhabits moist woods and, though growing to a large size, is a short lived tree—often falling before a heavy gale, and shewing a rotten heart. This Province and New Bruns-

wick, perhaps, afford the finest specimens of this tree. Here I have seen it growing to the height of 60 feet.

The large, erect, sessile cones of the Balsam Fir are very beautiful in the end of May, when they are of a light sea-green colour, which, changing in June to pale lavender, in August assumes a dark slaty tint. They ripen in the fall, and the scale being easily detached, the seeds are soon scattered by the Autumnal gales* leaving the axis bare and persistent on the branch for many years. In June each strobile is surmounted with a large mass of balsam exudation.

The summer of 1864 was marked as a most fructiferous season amongst all species of coniferæ on the American continent. The casual observer passing along the roads could not help observing the masses of brown cones which everywhere burdened the tops of the pines and spruces, and from which the Indians augured an unusually hard winter, through much the same process of reasoning that the English countryman prophecies a rigorous season from an abundant crop of haws and other autumnal hedge fruits. The hard season did not arrive, but the immense crop of cones killed a large number of trees, especially of the species under consideration. If not actually killed, many instances of the Silver Fir with a dead leading shoot, or with one just recovering its vitality may be constantly seen by any roadside observer. In the former case, a new leader, elected from the nearest tier of branchlets, is already lifting its head to continue the growth of the tree, and the latter instance, in which all the surrounding shoots and foliage have been vitally drained by the exhausting cone-crops, may be supposed to account for the long spaces or intermissions between the lateral branches of firs, at certain intervals up the main stem which are often to be observed.

The Silver Fir is remarkable for the horizontal regularity of its branches, and the general exact conical formation of the whole tree. An irregularity in the growth of the foliage, similar to that occurring in the black spruce, is frequently to be found in the fir. A contorted branch, generally half-way up the stem, terminates in a multitude of interlaced sprays which are, every summer, clothed with very delicate, flaccid, light-green leaves, forming a beehive

*The cones of other species of Ashes and Pines generally do not ripen until the 2nd year, whilst the expanded strobile remains attached to the tree for long after.

growth like that of the spruce. It may be always noticed, however, that whilst the spruce growth of this nature is persistent in its foliage, that of the fir is annually deciduous.

The Silver Fir is a graceful shrub up to a certain age, and its sprays, soft and flattened, form the best couch in the woodman's camp. The bark of the tree readily peels in summer, and is used in sheets to cover the lumberer's shanty, which is now built in prospect of the winter's campaign. The resinous fluid contained in the pustules is the Canada Balsam of commerce.

I am not aware that any exportation of balsam, or, indeed, of any resins is made from Nova Scotia. All such productions might be made profitable, as prices have recently been high in consequence of the American war, commerce having been plentifully supplied with tar, pitch, resin and turpentine from North Carolina and other states of the Confederacy. It must be noticed however, that the pines of the Southern States are not found in these Northern latitudes. They are the long-leaved or yellow pine (*P. Palustris*), and the loblolly or old field pine (*P. taeda*). Our common *P. strobus* affords but little resin. *P. resinosa* and *P. Rigidsa* or pitch pine are both resinous woods, as is also the larch. It is much to be regretted that so many thousand acres of these woods are yearly disappearing by fire and through wanton waste, whilst a source of profit like the above is still allowed to slip by unnoticed.

In conclusion I will append a few remarks on the transplanting and acclimatization of evergreens, a subject which I am glad to observe has been very practically studied of late years. It is patent to every one, resident in Halifax, that we are now compelled to suffer everywhere on this bleak peninsula for the wholesale destruction of trees on the part of the earlier inhabitants. The bitter winds experienced on a winter's drive over the common, and the roads to the N. West Arm and Three Mile House, oftentimes denuded of snow, which is at others piled in drifts, whilst the sleighing is excellent in both town and country, point, as a cause, to the cutting away of the road-side fringe of sheltering trees; and now the slow remedy of replanting must needs be applied. As a winter shelter the evergreen tree is naturally adopted, though in former times its association with the rigor of the climate doubtless resulted in its wholesale downfall at the hands of the early settlers, and there is

still a strong tendency about us to obliterate the evergreen vegetation.

Such however, happily, is not the exclusive spirit of our age, and I cannot refrain from adducing, as an example, the following letter which appeared recently in the local press, headed "Nova Scotia Evergreens":—

To the Editor of the Sun.

SIR,—To my fancy, there is not a tree that grows in the woods of Nova Scotia, that looks so graceful and becoming as evergreens near a dwelling house in winter. They refresh the eye, protect the building and small shrubbery, and give the homestead a snug, social aspect. They also bring up pleasant memories of summer and green fields, and, almost unconsciously to the beholder, promote healthful imagination and a refreshing quiet and repose.

Those who have tried to beautify their houses with Nova Scotia evergreens, mostly confess that they have failed in their object. There is not a tree that grows in our forest that is so hard to raise by transplanting as the Black and Red Spruce and the Balsam Fir; and yet, if properly treated, they will grow as freely as any plant of the forest.

I would say to those who love to see their own native evergreens growing around their dwellings, be not discouraged by any past attempts; success will be attained if they perform the work according to my plan and treatment.

Cultivated soil will not answer for evergreens, unless it is poor, and the subsoil clay or gravel is near the surface. The best soil for black or red spruce is the common light yellow clay or gravel, free from iron rust, and well mixed with greywacke rock and whinstone. If the clay should be mixed with fragments of iron-stone and blue slate, the White Pine, the Hemlock, and the Balsam Fir should be planted. The limestone soil is more suitable for White Cedar. Peaty or vegetable soil is best for the Larch.

The last week of April, and the first week of May, is the best time to remove evergreens for transplanting; then the soil is very soft, and the young trees easily taken out without fear of bruising their tender roots. Strong young plants can always be found on the outskirts of the woods. The average height of the plants should range from a half to two and a half feet, thickly set, with close branches and free from white moss. The plants should be removed on a dull day;—put them into bundles of one dozen each, and tie them with a soft string, and if a trench is already prepared, place the trees in just as they are, in bundles, close together, and cover the roots well with the clay; let them remain there until the tender feeders of the roots grow white. About the 1st of June you can remove the string and transplant them for a hedge or clump around the dwelling house, or elsewhere. They must be well protected from the high winds; the north-east and easterly winds are more injurious than any other.

The Balsam Fir or Silver Fir should be planted by themselves. No pruning is required for ten or twelve years, and then sparingly.

No other class of trees should be planted near the Evergreens, for they always grow more rapid when they are some distance from any other trees. It is labour in vain to transplant Evergreens in the fall of the year.

Halifax, Nov. 27, 1865.

F. MCKAY.

Our writer recommends transplanting evergreens in the spring,

saying it is useless to attempt it in the fall. On this point, however, the evidence which I have collected from most local authorities on the subject tends to reverse his conclusion; as it is generally admitted that the very best time for transplanting these trees is in the end of May or beginning of June—just when the young shoots, having broken their capsules, are conspicuous by their new bright-green colour. The plant now seems to be full of energy, and will adapt itself to circumstances in order to continue its efforts more quickly than when partially dormant. Very early in the season is perilous, as the Fir having so large an amount of evaporating surface is more apt to receive injury from the cold drying wind of early spring than deciduous trees. Spruces should be placed in the ground with their long diverging roots as near the surface as possible, merely placing around them the upturned sod.

Planting by seed is the usual plan for growing evergreens in the English and Scotch nurseries. The young plants have excellent roots, and are much more easily removed. The success of the Fir plants which have come over to this country is very noticeable, and the Norway Spruces on the Common, the Scotch Firs and Larches in the Cemetery and Horticultural Gardens, are much more forward than any of our indigenuous transplants. These trees appears to thrive admirably in this country: the English Larch is now everywhere in blossom, (May 7th,) with budding foliage, whilst our own species still seems wrapped in its winter sleep; the leading shoots of last season's growth on the Norway Spruce are nearly a yard in length, when the indigenuous transplant rises but a few inches.

ART. XIII. ON THE LAND BIRDS OF NOVA SCOTIA. BY A. DOWNS, *Cor. Memb. Zool. Soc. of London.*

[*Read May 3, 1866.*]

HAVING in my last paper completed the list of the Birds of Nova Scotia as far as the warblers, I now proceed with the wrens, creepers, sparrows, &c; but as our Institute has an abundance of matter for insertion in the next number of Transactions, I will not trespass too much by making this paper a lengthy one, but will reserve my additional remarks for next session, when, if life and health be spared me, I hope to complete the whole of the land birds.