

ON THE
FOREST AND OTHER TREES
OF
ABERDEENSHIRE.

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IN the Aberdeen Flora, published a few years ago, some remarks were introduced respecting the general features of the vegetation in the vicinity of Aberdeen; these chiefly had reference to the smaller wild plants, trees of natural growth being rare, and of inconsiderable dimensions in the lower parts of the county. Since that time my attention has been directed to the vegetation in other parts of Aberdeenshire, and in some of these, the trees of natural growth occupy a very prominent feature, and cover extensive tracts. Believing that some account of these, as well as of planted trees, whether indigenous or exotic, might, in the mean time, be interesting, and feeling conscious that the exertions of any single individual would be unequal to the labour of procuring the information wished for, a circular was addressed to gardeners, foresters, and others, in different parts of the county. A considerable number of reports was received, the results of which are embodied in the following remarks.

Several circumstances tend to diminish the value of such inquiries, and to render vague any useful inferences which might be deduced from them: for instance, no information was received of the attention which had been paid to the proper pruning and thinning of the trees. This omission was probably owing chiefly to a deficiency in the original circular, although at the same time it is probable (if I may judge from the fulness of some of the reports), that if any particular method of pruning had been adopted at any of the places afterwards mentioned, such would have been alluded to. The importance of attending to this is evident, from Mr Cree's method of pruning, recorded in Loudon's Horticultural Journal for January 1842. He has found, by experiment, that all trees (excepting the Fir tribe, for which his method is not adapted) under 18 feet in height, and 15 inches in circumference, advance at an average as much in height and circumference in six years, if the branches are properly shortened, as they do in fifteen years, if they are not shortened, or if the trees are improperly pruned. In very few instances was it stated, whether the trees were of natural growth, or had been planted; this in some cases is of considerable importance, especially as regards the Fir tribe, which are generally admitted to receive a check from the operation of transplanting. Independently, however, of these deficiencies, it is at least of some interest to be aware, that Aberdeenshire can produce such trees as are recorded in the following tables; and if any apology is necessary, I may take shelter under the high authority of M. De Candolle, who remarks,—“The longevity of trees is truly interesting, were it merely from motives of curiosity. If we prize every document of antiquity, why should we not attach a higher degree of importance to know whether such a tree be the contemporary of the oldest generations? In certain cases this knowledge might throw light on the history of monuments, as that of monuments on the history of trees in their vicinity. . . . If we reflect on the means of obtaining a solution of our question, we shall see that they are all founded on a more exact appreciation of the ordinary laws of the growth of trees, and that this direct knowledge may throw light on many parts of vegetable Physiology, and the art of Forestry. I therefore believe, that these inquiries may turn out to be useful; but were they



merely curious, I would still think that they might not be unworthy of being presented to the public.”—(Ed. Phil. Jour. 1833.)

I cannot omit this opportunity of stating my obligations to the gardeners, foresters, and others, who transmitted reports from the different places afterwards mentioned.

The measurements of the girth were recommended to be made at the surface of the ground, and at four feet from it. In some cases the former situation cannot be considered to yield such satisfactory results as the other. This is especially true respecting the spruce-fir, beech, and some others, whose trunks at that part seem frequently as if composed of several columns united into one; at four feet, on the contrary, the trunk is usually free from protuberances, and of an average thickness. Measurements of, at least, three of the largest of each kind of tree were requested, and, in most cases, received; it was, however, considered unnecessary, in general, to record here more than the largest.

Since climate exercises so great an influence over vegetation, it may not be improper to introduce here a few of the results of meteorological registers, made in different parts of the county. The mean temperature at Aberdeen, from nineteen years' observations by the late Mr Innes, is $47^{\circ}.1$, agreeing nearly with the results obtained by observations on the temperature of some of our best springs. The mean temperature at Buchanness Lighthouse, from registers for 1834–5–6, is $47^{\circ}.3$. The mean temperature at Alford, 26 miles inland, and 420 feet above the sea, is $45^{\circ}.03$, from observations during 1833 to 1841 inclusive. The mean temperature at Huntly Lodge, 30 miles inland, for the year 1830, was $45^{\circ}.04$; the water of a deep well, and of an open spring at the same place, and during the same period, afforded $45^{\circ}.4$ and $45^{\circ}.6$ respectively; the observations made at that place, however, have been continued for several years, and may probably yield a result different from the one recorded, to which alone I have access. It may be stated generally, there are exceptions; that, in this latitude, the mean of the three summer months is about 10° higher than that of the whole year; and the mean of winter as much below; the mean

of autumn being one or two degrees higher, and that of spring one or two lower than the annual mean. Occasionally, and especially inland, the temperature falls very low ; for instance, in the statistical account of the parish of Tullynessle, in the winter of 1837, it is stated that the thermometer indicated 12° below zero ; and at Aberdeen, on the 9th January 1841, the lowest was $+ 3^{\circ}.4$. The results obtained by rain-gauges being so liable to fallacy, it is needless to record such in this place ; neither shall I allude to the results obtained by readings of the barometer, since the effect produced at low elevations, by the varying pressure of the atmosphere, is still very obscure.

CONIFERÆ.—The Fir tribe.—*Pinus sylvestris*.—The Scotch Fir. Captain S. E. Cook, in an interesting paper, in the second volume of the Annals of Natural History, states that the *Pinus Cembra* and *P. uncinata*, are the only European species which live at a higher elevation than the Scotch fir. Its distribution through Aberdeenshire is very general, occurring near the sea level, and reaching an elevation of 2000 to 2300 feet. It is for the most part planted in the low grounds, where it never attains any great size ; and it is only in the forests of Mar and Balachbuie where we meet with it in a state of nature, and frequently attaining large dimensions. The abundant remains of this species found in peat mosses, in different parts of the country, shew that there must have existed extensive forests where no trees now grow.

In the reports which were received, no distinction is made between the two varieties of this species, which are admitted by some botanists ; and so far as my own observation entitles me to express my opinion, I believe that the redder colour of the wood in Mr Don's variety *Montana*, is merely accidental, owing to difference of soil and climate ; for examples occur in the lower grounds, of trees of this species yielding a pale wood, which is stated to be equally dense and valuable with that of the former. Some of the bog-timber of Ireland has been believed to be the remains of *Pinus mughus* (a species certainly nearly allied to *P. sylvestris*), the cones of which have been found in the peat of that country.

TABLE I.—*Pinus sylvestris*. THE SCOTCH FIR.

Girth at the soil.		Girth at 4 feet.		AGE.	SOIL.	LOCALITY, &c.
Ft.	in.	Ft.	in.	Years.		
6	4	5	6	95	Sand on gravel.	Parkhill.
7	9	6	3	120?	Gravel on gneiss.	Seaton.
6	4	5	9	.	.	Den of Rubislaw.
4	4	3	10	46	Peat and sand.	Philorth.
5	9	4	9	100	Clay bottom.	Pitfour.
3	9	3	5	40	...	Kiamundy.
8	2	7	6	90	Subsoil, gravel.	Strichen.
8	3	7	9	100	Black loam on clay.	Echt.
		6	0	.	.	Kemnay.
10	0	7	6	90?	.	Crathes.
7	2	.	.	.	.	Glassel.
8	6	5	8	.	{ Thin gravel on clay } { bottom. }	Tonley.
7	4	6	0	100	{ Light mould on } { hard gravel. }	Wardhouse.
4	3	3	0	40	...	Do.
9	0	8	2	95	Kindly soil on rock.	Leith Hall.
6	10	6	2	.	{ Alluvial on clay } { and gravel. }	Haughton.
7	0	6	0	70	Poor soil.	Breda.
10	2	8	2	97	.	Whitehaugh.
7	4	7	0	70	Rich clay loam.	Huntly Lodge.
7	6	7	0	85	{ Black surface, yel- } { low bottom. }	Newe.
6	9	5	8	70	{ Sandy loam, gravel } { bottom. }	Ballater.
6	3	5	2	.	.	Birkhall.
11	9	7	8	.	.	Abergeldie.
23	0	10 3 } twins 9 3 } at 6 ft.		{ 180 } { to } { 300? }	{ Open gravel soil. }	Invercauld (natural fir).
16	3	11	4	80	...	Do. (planted fir).
9	0	6	10	.	.	Mar forest (est. cub. contents = 250 ft.).
22	4	13	7	.	.	Do. (do. do. = 120 ft.).
19	6	12	10	.	.	Do. (do. do. = 220 ft.).
19	0	12	0	.	.	Do. (do. do. = 130 ft.).
17	9	11	9	.	.	Do. (do. do. = 190 ft.).
17	4	13	0	.	.	Do. (do. do. = 160 ft.).
17	4	11	2	.	.	Do. (do. do. = 140 ft.).
16	0	11	0	.	.	Do. (do. do. = 140 ft.).
17	6	10	8	200?	{ North exposure, } { soil gravel. }	Aboyne (natural firs).
14	0	12	2	...	...	...
13	8	8	8	...	...	...
11	10	8	0	120	{ South exposure, } { rich alluvial soil. }	... (planted fir).
12	2	6 2 } twins 5 6 } at 4 ft.		{ 90? }	...	...
8	8	7	2	...	...	...
8	9	7	0	...	...	...

As it is of some importance to study the relative development of the annual zones in sections at the base of the tree, the following notes may be of interest. The zones having been measured by a common tape-line, and the largest side selected, the pith being often eccentric, it must not be ex-

pected that the measurements thus taken can correspond precisely with those of the circumference; the thickness of the bark also, was not usually noted; still these rough notes will give a tolerable idea of the rate of growth:—

Firs in the Forest of Balachbuie, 120 annual zones in each.

No. 1.—Girth, 7 feet 8 inches.

Zones 1 to 20 = 2. inches.

... 20 to 30 = 2.25.

... 30 to 40 = 3.

... 40 to 50 = 2.

... 50 to 60 = 2.25.

... 60 to 120 = 5.

No. 2.—Girth, = 8 feet.

Zones 1 to 20 = 1. inches.

... 20 to 30 = 1.5.

... 30 to 40 = 2.25.

... 40 to 50 = 1.75.

... 50 to 60 = 1.

... 60 to 70 = 1.5.

... 70 to 120 = 3.

No. 3, of very irregular outline.

Zones 1 to 10 = 0.5. inches.

... 10 to 20 = 0.75.

... 20 to 30 = 1.5.

... 30 to 40 = 2.5.

... 40 to 50 = 2.

... 50 to 60 = 1.

... 60 to 70 = 0.75.

... 70 to 80 = 0.5.

... 80 to 120 = 1.5.

Firs in Forest of Glen Tanner.

No. 1.—80 zones; girth, = 5 feet 5 inches.

Zones 1 to 20 = 1.25. inches.

... 20 to 30 = 1.5.

No. 2.—83 zones; girth, = 5 feet 7 inches.

Zones 1 to 20 = 0.75. inches.

... 20 to 30 = 1.25.

... 30 to 40 = 1.25.

No. 3.—80 zones; girth, = 4 feet.

Zones 1 to 10 = 0.5. inches.

... 10 to 20 = 1.

... 20 to 30 = 1.12.

A section of one at Pannanich shewed 65 zones, and its girth at the soil was 3 feet 5 inches. Seven trees at Abergeldie, each having 60 zones, measured respectively (girth at the soil) 4 feet,—3 ft. 10 in., 3 ft. 8 in., 4 ft. 3 in., 3 ft. 6 in., 3 ft. 11 in., and 3 ft. 10 in.

A tree of this species in the Dry Den, near Aberdeen, shewed 70 zones; its girth at the soil was 3 feet 8 inches.

Zones 1 to 20 = 2.25. inches.

... 20 to 30 = 1.12.

... 30 to 40 = 0.75.

... 40 to 50 = 0.5.

... 50 to 70 = 0.75.

From the reports received, the following may be considered the average annual increase at different periods:—From six trees at Kinmundy and Wardhouse, 40 years old, 3.4 and 4.8 lines respectively, giving a mean of 4.1 lines;* five trees at Breda and Huntly Lodge, 70 years old, 4.1 and 4.5 respectively, giving a mean of 4.3 lines; three trees, 90 years old, at Strichen, give a mean of 3.9 lines; nine trees at Pitfour, Echt, and Wardhouse, 100 years old, afford respectively 2.4, 3.2, and 2.7 lines, the mean being 2.76 lines; two trees in the forest of Balachbuie, 120 years, give a mean of 2.9 lines. These results have reference to the diameter at the *thickest part*. On the supposition that the correct ages of the trees were stated, it would seem that the growth continues steady up to 70 years, diminishing from that period to 90; the examples at Balachbuie are no doubt very favourable, and hence the increase shewn by them can scarcely be considered as generally happening. It must also be kept in view, that the trees measured were the largest at each place, and that the results would differ materially were the calculations made from a number of trees shewing the extremes (highest and lowest) at the same age in the same place.

In the report of natural firs in Invercauld forest, the age was reported from 180 to 300 years, and girths of 10 trees were given, the largest being that in the accompanying table, and the smallest 8 feet 9 inches at the soil, and 7 feet in girth at 4 feet. The mean annual increase calculated from these

* A line is $\frac{1}{12}$ th of an inch.

ten trees, and assuming them to be 180 years old, would be 3.3 lines. There can be little doubt that the largest of these far exceeds 300 years, as from 100 to 120 years, the annual zones in the sections above recorded were so small that it was very difficult to trace them. The forester at Invercauld states, that "the second tree of natural fir in Table I. at 25 feet from the soil, measures 7 feet 3 inches girth, the solid timber in it being 160 feet. Another measuring at the soil 9 feet 6 inches, at 4 feet, 8 feet 2 inches, and at 27 feet, 6 feet 9 inches, contains of solid timber 150 feet. Another at the surface of the soil is 8 feet 9 inches; at 4 feet 7 feet; at 16 feet it is 6 feet 2 inches, with a clean trunk to the height of from 40 to 50 feet, and shooting up to the entire height of 70 to 80 feet. This small tree is only a specimen of hundreds of trees of the same size around it." Mr Cumming of Allanaquoich, to whom I am indebted for measurements of 28 of the largest trees in Mar forest, says, "Most of them are supposed to be from 200 to 300 years old; some of them probably more. The cleanest and straightest grown trees are generally found on the north sides of the hills; the most branched, and, when cut up, the most knotty, on the south side. The south side of the tree is also, for the most part, the most branched, and the north side least. It is also to be remarked, that wherever tall clean trees are to be found, it is either when they still stand comparatively close to each other, or when the ground bears evident marks of their having done so at some period. Generally speaking, in very old trees, those having fine smooth bark are the most likely to be rotten in the heart; but the quality of such portions as are not affected with rot, is finer than that with rough bark." In the 7th volume of the Transactions of the Highland Society, it is stated, that three trees from Mar forest, one of which had been felled for three years, another one year, and the third eight months, were tested at Woolwich. Each of these three trees was about 28 inches in diameter at the root, and contained 50 feet in length of serviceable timber, the grain remarkably clean, free from knots and full of turpentine; and from the results it appeared, that their strength exceeded that of any other fir submitted to experiment, although a specimen of Riga was selected from a tree supposed to be of superior quality, on purpose to form a comparison. The forest of Mar, from which these were brought, is the property of the Earl of Fife, contains upwards of 60,000 trees of the above description (the results of these trials were pub-

lished in 1817), besides an immense number of less dimensions, fit for various purposes.

Mr Mortimer, wood-merchant here, informs me, that the best planted trees of this species occur at Aboyne ; they range from 80 to 100 years of age ; many of them contain from 30 to 40 cubic feet ; and of those on the Newhill, at the same place, several have from 40 to 80.

A remarkable distortion of the trunks of the Scotch fir may frequently be seen in different districts ; the stems present the most fantastic shapes, and the letter S represents a form frequently assumed ; the trees are evidently not in a thriving condition, owing, no doubt, to this distortion. This effect is well known to be produced by the drifting of snow upon the trees when young, and while their stems are still slender and flexible. Examples of this occur at Scotston and Hazelhead, near Aberdeen, and at Achernach, in Strathdon ; and it is probably common in other places.

Larix Europæa.—The Larch. This valuable tree is now very general in Aberdeenshire, occurring from the sea level to 1800 feet ; this last is the greatest altitude at which I have seen it in this county ; it had evidently been some years planted, but was not thriving ; the plants formed low-stunted bushes. In the 4th volume of the Horticultural Transactions, it is stated by the Duke of Athole, that in mountainous tracts of this country, at an elevation of 1500 to 1600 feet, the larch, at eighty years of age, has arrived at a size to produce 300 cubic feet. Captain S. E. Cook (*loc. cit.*) says, that it is spread from the S. Alps to Siberia, but never grows naturally at a low level, excepting far to the north. The most southern site known to him is in the high Apennines, near their junction with the Alps in Piedmont, where there are vast and almost inaccessible forests of trees of the largest dimensions. It is common in the highest Piedmontese Alps, around Mont Rosa and Mont Blanc ; and in ascending the great St Bernard, is seen far above every other tree. Authors tell us that a certain elevation of surface, coldness of climate, and inferiority of soil, are necessary to produce its timber in perfection. The accuracy of this seems doubtful.

TABLE II.—*Larix europæa*. THE LARCH.

Girth at the soil.	Girth at 4 Feet.	AGE.	SOIL.	LOCALITY.
Ft. in.	Ft. in.	Years.		
4 8	3 5	.	. . . . .	Den of Rubislaw.
6 0	5 0	.	. . . . .	Dry Den.
6 0	5 0	60	Clay bottom.	Aden.
4 6	3 0	45	Light loam, rocky bottom.	Kinmundy.
8 4	7 10	80?	Clay subsoil.	Strichen.
7 0	5 6	.	Sandy soil.	Cluny.
8 10	. .	.	. . . . .	Glassel.
11 6	8 6	90?	. . . . .	Crathes.
11 8	6 9	60	Red gravel, clay bottom.	Tonley.
6 0	4 1	35	Wet surface, gravel bottom.	Warehouse.
4 10	3 6	32	Thin poor soil, gravel bottom.	Do.
3 0	2 2	34	Thin black mould on hard bottom	{ Do. (upwards of 1000 feet above sea level).
9 3	8 1	67	Clay soil on gravel.	Leith Hall.
6 10	5 2	55	Strong loam.	Do.
11 8	8 6	70	. . . . .	Breda.
	7 9	70	. . . . .	Kemnay.
3 4	3 0	28	Black surface, yellow bottom.	Newe.
8 0	7 2	90	... ..	Edinglassie.
8 4	6 5	70	Light sand, gravel bottom.	Ballater.
8 8	6 0	.	. . . . .	Birkhall.
10 9	6 1	.	. . . . .	Abergeldie.
13 0	8 4	80?	Rich gravel.	Invercauld.
4 9	3 3	50?	. . . . .	Altguisach.
5 10	4 0	.	. . . . .	Corymulzie.
10 4	7 0	.	. . . . .	Mar Lodge Garden.
10 3	10 1	.	. . . . .	Do. Do.
10 6	7 6	75	Sharp soil, gravel subsoil.	Aboyne.
9 6	7 10	.	... ..	"
9 3	8 7	.	... ..	"
8 3	6 5	43	... ..	"

A section of a larch at Tonley had 41 zones, and its girth at the soil was 5 feet 7 inches; the breadth from the pith to the bark, on the east side, was nearly 12 inches, the pith being nearest the west side.

Zones 1 to 10 = 1.5. inches.

... 10 to 20 = 3.

... 20 to 30 = 2.8.

... 30 to 40 = 4.

... 40 to 41 = 0.5.

Another in the same place had 53 zones, and measured (exclusive of the bark) 5 feet 6 inches at the thickest part

Zones 1 to 10 = 3. inches.

... 10 to 20 = 3.

... 20 to 30 = 1.75.

... 30 to 40 = 2.

... 40 to 50 = 1.

The average annual increase (at the thickest part), at different periods, is as follows :

34 years	=	3.8 lines	(3 trees at Wardhouse).
35	=	6.6 ...	(3 do. do.).
45	=	3.9 ...	(3 trees at Kinmundy).
60	=	3.9 ...	(3 at Aden).
...	=	7.5 ...	(3 at Tonley).
70	=	7.01 ...	(3 at Breda).
80	=	6.9 ...	(3 at Invercauld).

As it is well known that the larch is of very rapid and steady growth, it seems very evident that the trees in the above table, of 34, 45, and 60 years, are not in a thriving condition. Exclusive, therefore, of these, the others shew that the increase of the larch continues steady to a considerable age; at the same time it may be stated, that the comparison would have been more valuable if it had been possible to compare trees of different ages, growing in the same place and similar soil.

Sir Henry Steuart, in his essay on Planting, observes, "To those acquainted with the rapid progress made by the larch, on a gravel soil on which any tolerable quantity of vegetable mould has been aggregated, it is a fact well known, that it doubles its value every *three years* after fifteen years old, and every *five years* after twenty-five years." The gardener at Finzean reports, that he measured some trees, each containing 30 cubic feet, not above 48 years old, and of excellent quality. It will be evident, from the large dimensions of some of the trees in Table II., that there are many localities in Aberdeenshire admirably suited to the growth of the larch. In the statistical account of the parish of Monymusk, it is stated that at the old garden of Paradise, there are larches upwards of 100 years old, several of which measure from 10 to 11 feet in circumference at the lower part of the trunk, and were found in 1826 to be from 90 to 103 feet of extreme height, and to contain from 170 to 190 cubic feet of timber. Some of our best Aberdeenshire larches fall little short of those at Monzie, Dupplin, and Dunkeld, mentioned in Loudon's Magazine, May 1842, their age and other circumstances being considered. Mr Campbell, wood-merchant here, informs me that larch-timber, of Aberdeenshire growth, is of very fine

quality, the market price ranging from 18d. to 20d., and in the forest 1s. per foot.

It is well known that the larch is very liable to fail, owing to at least three causes,—1st, The attacks of insects, *Eriosoma laricis* and others; 2d, decay in the centre, usually called *pumping*; and, 3d, *sloughing* of the bark. In addition to these, there cannot be a doubt that, in certain situations, the leading shoot is liable to be hurt by the frosts, which often happen in August and September. Some reports were forwarded on this important subject, and may be inserted here.

“At Echt larches do not thrive; an insect gets into the young growths after ten or fifteen years, and the trees die.” The gardener at Wardhouse alludes to the disease, which he calls blisters, “which form from two to three feet from the ground; they are produced on two sides of the tree alternately, until they reach the top, when the tree dies.” He also states, that about two acres had been planted with larches after a crop of Scotch firs. About two years ago ten of these trees (thirty years old) were cut down, and of these three were from four to eight feet up the tree in a state of decay, with a number of small white spots, spreading along the interior of the tree, and destruction rapidly following them. These trees had a healthy appearance; they grew on a poor thin soil with a gravel bottom. At Tonley, “the best larches are uniformly to be found in well-sheltered dens; on land which has been formerly cultivated they spring up rapidly, but in deep mould, when rooted up by the wind, shew rotten roots, and the trunk is often decayed in the centre.”

In the vicinity of Aberdeen instances of this disease have also occurred, as at Den of Rubislaw and Scotston. The gardener at this last place states, that the decay usually commences in one or more of the principal divisions of the root, and that it spreads from them to the centre of the trunk. “About Keith Hall the larch trees are all dead; it cannot be the soil nor age which has produced this, for they are all the same, although in different soils and of different ages, the cause seems to have been the hard frost in 1838, for they have all been in a state of decay ever since.”

In exposed situations it will be often observed that the leading shoot of young larches has been destroyed, and an-

other has sprung from the side of the decayed remains of the first. In some cases this has been repeated more than once, in consequence of which the trees have assumed a distorted appearance; this effect is usually, and probably with justice, attributed to the action of frost upon the young leading shoot, while still green and full of sap.

Abies excelsa.—The Spruce Fir. This species has been rather generally planted in Aberdeenshire; there are many thriving examples of it near the sea level, but I have not observed the absolute highest altitude attained by it. There are, however, good trees of this species at Altguisach, near Loch Muich, at an elevation of 1400 feet; and some fine examples at Invercauld, probably reaching 1200 feet.

Captain S. E. Cook ranks it as the first in hardiness belonging to the genus. It ranges from Lapland to Savoy, south of which it is not found in the natural state. It would appear to live farther north than the *Pinus sylvestris*, its only neighbour in the north of Scandinavia; but it is, he says, possible, that dampness of soil, which it resists better than any of the tribe, may be the cause of this apparent greater degree of hardiness.

TABLE III.—*Abies excelsa*. THE SPRUCE FIR.

Girth at the Soil.	Girth at 4 Feet.	AGE.	SOIL.	LOCALITY.
Ft. in.	Ft. in.	Years.		
7 4	5 4	. .	. . . . .	{ Dry Den, near Aberdeen.
3 0	. .	38 zones.	. . . . .	Do.
4 11	4 3	46	Heathy sandy soil.	Philorth.
5 6	4 6	100	Clay bottom.	Pitfour.
4 6	4 3	50	Clay bottom.	Aden.
4 0	3 4	45	Light loam, on rocky bottom.	Kinmundy.
6 10	6 4	100	Deep black mould, on clay.	Strichen.
7 2	6 5	100	Thin soil, on clay.	Echt.
8 0	5 6	.	. . . . .	Cluny.
	5 11	.	Peat.	Kemnay.
7 4	. .	.	. . . . .	Glassel.
9 4	6 10	60	Gravel, on clay bottom.	Tonley.
6 3	4 7	100	Light mould, on gravel.	Warehouse.
5 0	4 2	40	Sharp light soil, on hard bottom.	Do.
8 10	6 3	67	Good soil, on rock and gravel.	Leith Hall.
8 0	5 4	70	Poor soil.	Breda.
14 6	10 6	97	. . . . .	Whitehaugh.
4 8	4 4	23	Black surface, yellow bottom.	Newe.
10 0	8 4	90	... ..	Edinglassie.
6 4	4 10	70	Light sandy loam, on gravel.	Ballater.
8 0	6 4	.	. . . . .	Abergeldie.
20 0	9 0	75	Rich gravel.	Invercauld.
12 6	8 5	80	Good shelter, in rich soil.	Aboyne.
11 0	9 6	"	... ..	...
8 9	6 6	"	... ..	...

The following results shew the average annual increase at different ages.

28 years	=	6.9 lines	(3 trees at Newe.)
40 ...	=	5.2 ...	(3 at Wardhouse.)
45 ...	=	3.2 ...	(3 at Kinmundy.)
50 ...	=	3.07 ...	(3 at Aden.)
60 ...	=	6.3 ...	(5 at Tonley.)
70 ...	=	3.9 ...	(3 at Ballater.)
90 ...	=	4.3 ...	(3 at Edinglassie.)
100 ...	=	2.1 ...	(3 at Pitfour.)
... ..	=	2.9 ...	(3 at Strichen.)
... ..	=	2.9 ...	(3 at Echt.)
... ..	=	2.5 ...	(3 at Wardhouse.)

From this it would seem as if the spruce increased steadily and rapidly up to ninety years, and then began to grow less, but still at a steady rate. The average for sixty years presents the greatest deviation, that is, if the age be correctly stated. Tonley is in the parish of Tough, and in the vale of Alford, probably one of the most fertile districts in the county. The results for 100 years are very close, considering the distance between the different localities.

In the statistical account of the parish of Monymusk, it is stated, that a spruce at Paradise is 11 feet 2 inches in circumference at the base, and five feet up separates into two equal stems, each rising 92 feet in height; it measures $212\frac{1}{2}$ cubic feet.

On referring to Table III., the great girth of the tree at Invercauld must attract notice, especially when contrasted with trees about the same age, and its own girth at four feet up. The spruce often presents a very broad base of very irregular outline, so that its true circumference at that point cannot be ascertained by the usual means, but will be over-rated; and this is no doubt true respecting the one alluded to.

The great size of some of the trees in the table, contrasted with their age, shews that this species finds a soil and climate congenial to it, in different parts of the county. Captain S. E. Cook observes, "although its timber, which is dry and light, may not equal that of some of the kindred species in utility for some purposes, it is a most valuable tree and well worthy more attention than it has received in an economic point of view."

Abies pectinata.—The Silver Fir. This species cannot be said to be of very general occurrence in Aberdeenshire; it is, however, found near the sea level, as at Philorth, and above 1000 feet at Invercauld and Mar Lodge.

Captain S. E. Cook says, "It is unquestionably less hardy than the spruce. It ranges less to the north, and farther to the south, than *Pinus sylvestris* or *Abies excelsa*. It descends into the comparatively genial climate of Navarre, and the Basque provinces."

TABLE IV.—*Abies pectinata*. THE SILVER FIR.

Girth at the Soil.		Girth at 4 Feet.		AGE.	SOIL.	LOCALITY.
Ft.	In.	Ft.	in.	Years.		
5	5	4	8	46	Heathy, sandy soil.	Philorth.
6	0	5	9	100	Clay bottom.	Pitfour.
8	0	5	9	...	...	.....
11	6	10	11	100	Loamy surface, subsoil gravel.	Strichen.
6	2	6	0	100	Light mould and gravel.	Wardhouse,
4	4	.	.	.	.	Glassel.
12	0	9	0	70	Poor soil.	Breda.
12	0	9	6	100	Rich loamy clay.	Huntly Lodge.
6	10	5	0	70	Light sandy loam, subsoil gravel.	Ballater.
7	9	6	6	75?	Rich gravel.	Invercauld.
9	6	7	2	...	.	Mar Lodge.

There are six fine trees of this species at Huntly Lodge. The dimensions of the largest are given in the table; the smallest has a girth of 8 feet at the soil, and 7 feet 5 inches at 4 feet from the soil; they are said to have been planted by the first Duchess Dowager of Gordon in memory of some of her ancestors. The situation of those at Invercauld is "a south exposure, and the soil is of a rich gravelly nature; their entire height is from 70 to 80 feet; they appear to be healthy; their leading shoot extends from seven to nine inches yearly."

The mean annual increase in diameter at different ages is,

46 years	=	5.1	lines	(3 trees at Philorth).
70	...	=	7.08	... (2 at Breda).
...	...	=	4.08	... (3 at Ballater).
75	...	=	4.62	... (3 at Invercauld).
100	...	=	3.2	... (3 at Pitfour).
...	...	=	4.6	... (6 at Huntly).
...	...	=	2.6	... (3 at Wardhouse).

Captain Cook, in the paper already quoted, states, that

“the natural habitats of this species are rather characterized by humidity. This observation is of material importance, as to the economic value of the tree, because it would point out the species as particularly suited to most parts of these islands, of which the climate seems peculiarly fitted to its cultivation on an extended scale.”

Mr Grigor of Forres, in his prize essay on forest plants, states, that it attains a greater size in 70 years than any other fir, provided the ground is deep and well sheltered. Captain Cook says, that the silver-fir would no doubt repay the cultivation in certain localities suited to it, its growth being rapid; and it resists the wind much better than the spruce. He alludes to an instance in which, near Plymouth, the proprietor of an estate there was offered, by the people of the dockyard, one hundred guineas for a single tree of this species; it was during the war and the highest prices. The same author alludes to a statement by Mr Salvin of Croxdale, near Durham, respecting it; who says, that the silver-fir, when felled and left on the ground, resists the effects of a humid climate and damp soil better than the larch, although the timber of the former is considered less valuable than that of the latter.

Pinus Strobus.—The Weymouth Pine. Two examples of this species were reported as growing at Aboyne, having the following dimensions:—

At base, 9 ft. 0 in. ; at 4 feet, 7 ft. 8 in.
 ... 6 ft. 0 in. ; ... 5 ft. 9 in.

They are situated in a rich alluvial soil, well sheltered, and are in a healthy state, their age about 70 or 80 years.

Mr Aitcheson, gardener at Huntly Lodge, informs me that the following trees were planted three years ago on the Binhill at Huntly, and are all thriving:—

Cedrus Libani.	Pinus Austriaca.
... Deodara.	... Laricio.
Abies Morinda.	... pungens.
... Canadensis.	... resinosa.
... taxifolia.	... rigida.
... Fraseri.	

Pinus Cembra and *P. pumilio* are growing on the top of the Binhill, at an elevation of 1000 feet above the sea.

TAXACEÆ.—*Taxus baccata*.—The Yew. This tree, although now admitted into all catalogues of British plants, is yet believed by some to have been originally introduced. There have been, and still are, however, individuals in Britain of great age, for example, that of Fountain's Abbey, Yorkshire, said to be 1200 years old; another at Crowhurst, Surrey, 1400 years; and one believed to be still older at Fortingall, Perthshire, whose circumference in 1769 was 52 feet.

It is by no means common in Aberdeenshire, and there are few of great age. It is stated to be frequent in churchyards in England and Wales. I do not remember to have seen it in such a locality in this part of the country, the ash and the elm usually occupying its place.

TABLE V.—*Taxus baccata*. THE YEW.

Girth at the Soil.		Girth at 4 Feet.		AGE.	SOIL.	LOCALITY.
Ft.	in.	Ft.	in.	Years.		
6	6	5	11	200	Strong soil,—good shelter.	Leith Hall.
5	2	5	2	...	Sandy loam.	...
3	2	1	9	...	Strong damp soil,—exposed.	...
8	3	9	9	.	Light black loam, with gravel subsoil of 4 to 6 feet, under the gravel a considerable depth of stiff clay.	} Ellon.
9	5	12	6	.		
10	4	12	10	.	.	...
8	1	9	2	.	.	...
7	10	10	10	.	.	...
9	10	12	9	.	.....	.....

The average annual increase of the three trees at Leith Hall is,

No. 1 = 1.4 line.

No. 2 = 1.1 ...

No. 3 = 0.72 ...

the mean being 1.073 line.

The late Professor De Candolle in his essay on the longevity of trees, says,—“If we admit an average of a line annually for very old yews, it is probably within the truth, and that in reckoning the number of their years as equal to that of their lines of diameter, they are younger than they actually are.” According, then, to this, if we suppose the three yews in our table to be of the same age as the number of lines in their respective diameters, the first ought to be nearly 300 years

old, the second upwards of 200, and the third about 144 years of age. M. De Candolle's rule is not, therefore, generally applicable, at least to trees growing in this climate. Mr Bowman, in a paper read at the meeting of the British Association in 1836, has also proved its incorrectness in reference to yews growing in some parts of England and Wales. The yews at Ellon are branched off a little above the soil, but the branches remain in nearly a close body until about 4 feet up, and then they spread away. At Crathes the yew-trees are stated to be very fine, some of them growing in clefts of rocks, and all of natural growth, never having been planted in such situations. One of them measures at the base 5 ft. 6 in., and at four feet up 4 ft. 6 in.

CUPULIFERÆ.—*Quercus robur*.—The Oak. If it is admitted that there are two distinct species of oak in Britain, it is to be feared that the following results are of comparatively little value, since all the reports received refer simply to the oak, no distinction being made. When we consider that botanists of high authority are still divided in opinion respecting the existence of two distinct British species, we need not be astonished that gardeners and foresters, not many of whom study the distinctions of species, at least in such cases as this, should not discriminate between the two. Dr Greville, in a valuable paper on this subject, in the Transactions of the Edinburgh Botanical Society, comes to the conclusion that “The received botanical characters (founded on the comparative lengths of the peduncle and petiole) by which *Quercus robur* and *Q. sessiliflora* and the *Q. intermedia* of some authors are at present distinguished, pass into each other insensibly and completely, and cannot, therefore, be depended on in collecting acorns for seed, and supplying the dockyard with timber. A remarkable difference in the timber has long been observed, that of *Q. sessiliflora* being termed red oak, that of *Q. robur* white oak, from the colour of the wood.” He farther states, that “the relative merits of the two kinds do not seem to be quite satisfactorily established; but the greatest weight of testimony seems to be in favour of red oak, contrary to the expressed opinion of Sir J. E. Smith; and it may still be a question, whether the superiority of the one timber over the other depends upon the specific difference of the tree.”

The oak in Aberdeenshire extends from the level of the sea, as on the Buchan coast (and on the Kincardineshire sea

cliffs ten miles south from Aberdeen), in which situation it forms low stunted bushes, to an elevation of 1400 feet on the Pannanich cliffs, where it is associated with the mountain ash, birch, and aspen. On the hill of Craigendarroch there are *natural oaks*, and in other places near Ballater and Monaltrie. All the trees in these stations appear to correspond with the description usually given of *Quercus robur*.

Oaks appear to have been in former periods more abundant, and of larger dimensions, than any existing at the present day in this part of the country. Several years ago, very large but mutilated trunks of oak trees were disinterred from a considerable depth at Poyner Neuk, near Aberdeen; one of these is still preserved upon the Inch at the harbour. And during the operations for conducting the water of the Dee to the engine-house at the old bridge, numerous oak stems were met with at a depth of nearly 20 feet below the surface of the soil; many of these were in a good state of preservation, and articles of furniture were manufactured from them. It is stated in the Statistical Account of the Parish of Drumblade that several oaks of considerable size were found there imbedded in peat.

TABLE VI.—*Quercus robur*. THE OAK.

Girth at the Soil.		Girth at 4 Feet.		AGE.	SOIL.	LOCALITY.
Ft.	in.	Ft.	in.	Years.		
8	6	.	.	175	Clay loam, on clay.	Philorth (girth at 2 feet).
7	6	5	0	100	Clay bottom.	Pitfour.
4	6	4	0	20	Rocky bottom.	Aden.
2	4	1	10	45	Dark soil.	Kinmundy.
8	0	7	6	300	Loam surface,—clay subsoil.	Strichen.
7	3	4	10	.	.	Cluny.
8	0	7	0	70?	.	Crathes.
6	10	.	.	.	.	Glassel.
8	8	6	0	.	Red gravel on clay.	Tonley.
6	5	5	7	200	Strong black loam.	Leith Hall.
3	0	2	8	65	Rocky bottom.	...
7	6	6	6	70	Poor soil.	Breda.
4	3	3	6	200	Alluvial soil on clay.	Haughton.
10	0	9	6	90	Rich loam.	Huntly Lodge.
1	10	1	8	28	.	Newe.
10	0	8	10	80	Rich deep alluvial soil.	Aboyne.
7	0	5	7	.	Sandy loam,—gravel bottom.	Ballater (Natural Oak).

On reviewing this table, several striking contrasts will be observed, for instance, between those at Aden and Kinmundy,

and Breda and Haughton. Mere differences of soil can scarcely account for these discrepancies, probably the reports may allude to (the so called) different species, or the ages have not been correctly ascertained.

The average annual increase at different ages, is as follows:—

70 years,	.	.	= 4.4 lines.	(3 at Breda.)
90 ...	.	.	= 4.8 ...	(3 at Huntly.)
100 ...	.	.	= 2.8 ...	(3 at Pitfour.)
200 ...	.	.	= 1.4 ...	(2 at Leith Hall.)
300 ...	.	.	= 1.1 ...	(3 at Strichen.)

As it is probable that the reports may have related to different species, it would be rash, at present, to draw any conclusions from these results. De Candolle says,—“The oak is undoubtedly one of the most long lived trees of Europe; but its study is involved in great ambiguity, either because it is a tree which, by the admission of foresters, is principally modified by soil, or because the wood of *Quercus pedunculata*, which grows quickly and to a great height, has been very generally confounded with the *Quercus sessiliflora*, which grows more slowly, becomes *harder and is more tortuous*.”

Two examples of the hornbeam (*Carpinus betulus*) were reported, one at Crathes having a girth of 9 feet 6 inches at the ground, age 70 to 90 years, and another at Aboyne, measuring 9 feet in girth, the age about 95 years.

Fagus sylvatica.—The Beech. This tree is rather general in Aberdeenshire. I have not, however, been able hitherto to ascertain its upper limits.

According to Mirbel, it occurs in Palestine, Asia Minor, Armenia, Mazanderan, Greece, Sicily, S. Italy, Valencia; it is naturalized in Britain, Norway, to 59° in favourable situations, Sweden to $58^{\circ} 30'$, in Westrogoth to 57° , in Smoland to Calmar on the shores of the Baltic, in great forests in Scania and Smoland, Russia, Lithuania and Poland, South Crimea, Caucasus to Terek, but no other part of Russia.

According to Von Buch, between $45\frac{1}{4}^{\circ}$ and $46\frac{1}{2}^{\circ}$ N. Lat., the line of beeches on the Alps rises to 5132 feet, the snow line being 3848 feet higher.

TABLE VII.—*Fagus sylvatica*. THE BEECH.

Girth at the Soil.		Girth at 4 Feet.		AGE.	SOIL.	LOCALITY.
Ft.	in.	Ft.	in.	Years.		
10	9	8	11	.	Light soil, 2 feet deep.	Parkhill.
11	4	9	2	175	Clay loam on clay.	Philorth.
10	0	8	0	100	Clay bottom.	Pitfour,
4	3	3	0	45	Peat soil.	Kinnundy.
11	6	11	0	300	Loamy surface,—clay subsoil.	Strichen.
12	0	10	6	60	Subsoil, hard clay.	Echt.
12	4	10	2	.	.	Cluny.
.	.	12	5	100	Sandy soil.	Kemnay.
12	0	11	0	100	.	Wardhouse.
11	0	8	4	.	Red gravel on clay.	Tonley.
25	6	18	6	above 100	.	Crathes.
6	10	.	.	.	.	Glassel.
10	4	.	.	95	Light sandy loam on rock.	Ellon.
8	6	.	.	95	... ..	...
10	0	8	2	100	Fine yellow soil on rock.	Leith Hall.
7	3	5	8	90	... ..	...
7	2	5	11	70	Poor soil.	Haughton.
11	3	9	0	.	.	Whitehaugh.
12	0	8	10	.	.	Balfuig (Alford).
12	6	10	9	100	Rich loamy clay.	Huntly Lodge.
20	0	17	0	200	Rich sandy loam.	... ..
6	4	6	0	90	Black surface, yellow bottom.	Edinglassie.
10	0	9	2	85	Deep rich alluvial.	Aboyne.
6	6	4	6	.	.	Abergeldie.

From the accompanying table it will be evident that this county presents, in many parts, a soil and climate favourable to the growth of this tree.

The beech at Crathes, at 12 feet up, divides into seven or eight very strong branches, and it overshadows nearly half an acre of ground. Respecting the one at Huntly Lodge, generally known by the name of the Castle Park Beech, the gardener writes,—“This once stupendous and beautiful tree is now fast verging to decay, its branches are withered, and no more of its stately structure remains to perpetuate its memory than part of its stem about 20 feet high. Its branches appear to have occupied a space of about 120 yards in circumference.”

In the Statistical Account of the Parish of Meldrum, reference is made to some fine beeches near the House of Meldrum, and one, in particular, is about 60 feet high; its branches occupy a space of 243 feet in circumference, the girth of the trunk is 11 feet 8 inches, and the longest entire branch is 51 feet.

The following presents the annual average increase in diameter at different ages:—

45 years	=	3.9 lines	(3 at Kinmundy.)
60 ...	=	7.5 ...	(4 at Echt.)
70 ...	=	4.4 ...	(3 at Haughton.)
90 ...	=	3.9 ...	(3 at Edinglassie.)
100 ...	=	4.5 ...	(3 at Pitfour.)
... ..	=	4.4 ...	(3 at Wardhouse.)
... ..	=	4.3 ...	(3 at Leith Hall.)
... ..	=	5.3 ...	(3 at Huntly.)
176 ...	=	2.5 ...	(3 at Philorth.)

The beech seems of very rapid growth under favourable circumstances. It is reported to be the most thriving tree near Cluny Castle. Beech trees are very numerous and thriving about Tonley. The natural soil at Wardhouse is a thin stratum of light mould, with a good mixture of gravel, and a hard gravelly bottom; numerous trees of different kinds thrive in it, but it is considered best for beech. The gardener at Leith Hall has observed the best trees of this kind to grow in good soil, with gravel or rock under it; it will also do well on thin light soil; where it is desirable to have it of large size, it ought to be well sheltered from the wind.

Corylus avellana.—The Hazel. This plant occurs naturally in different parts of the country; it is common about Aberdeen, near the level of the sea, and in the interior reaches an elevation of 1600 feet. Its remains are of frequent occurrence under deposits of peat, the nuts being often found in an entire state, along with the roots and branches of the parent trees on which they grew. At Corymulzie Linn, near Castleton of Braemar, and at an elevation of about 1100 feet, I measured a trunk of it cut at the ground, and found it two feet two inches in circumference; it presented sixty zones, which were of very uniform size, the first six and the last ten were, however, rather narrower than the others.

Castanea vulgaris.—The Chestnut. This tree is not very frequent in Aberdeenshire. According to Mirbel, it does not ripen its fruit excepting where the vine is successfully cultivated. Mr Winch states, that it does not ripen fruit in the northern counties of England between 54° and 55° lat.

TABLE VIII.—*Castanea vulgaris*. THE CHESTNUT.

Girth at the soil.		Girth at 4 feet.		AGE.	SOIL.	LOCALITY.
Ft.	in.	Ft.	in.	Years.		
15	2	11	10	.	Gravel on clay and rock.	Waterton (near Ellon).
7	6	6	6	70?	.	Crathes.
4	6	.	.	.	.	Glassel.
14	0	11	4	.	.	Tonley.
13	3	10	0	95	Deep rich alluvial soil.	Aboyne.
4	4	3	5	.	Sandy soil.	Ballater.

From the few examples here recorded, it would appear that this tree thrives well in different parts of the county; and it is to be regretted that the ages have not been satisfactorily ascertained in any of the cases. I am not aware whether its fruit ever arrives at maturity in this part of the country.

TILIACEÆ.—*Tilia europæa*.—The Lime Tree. It appears doubtful whether the measurements recorded in the following table all refer to the same species; it is, however, very probable that they do.

I have not had an opportunity of measuring the absolute highest elevation attained by the lime tree in this country; it is stated, however, that it thrives well at Ballater at an altitude of 800 feet, and at Birkhall, which is somewhat higher.

TABLE IX.—*Tilia europæa*. THE LIME TREE.

Girth at the Soil.		Girth at 4 Feet.		AGE.	SOIL.	LOCALITY.
Ft.	in.	Ft.	in.	Years.		
9	4	6	2	.	Sandy loam, gravel subsoil.	Ellon.
10	4	5	3	176	Clay loam, on clay.	Philorth (Girth at 2 and 4 feet.)
5	0	4	9	50	Rocky bottom.	Aden.
7	1	6	5	70 to 90?	Gravel subsoil.	Strichen.
6	4	4	10	.	.	Cluny.
11	6	7	6	70 to 90?	.	Crathes.
4	8	.	.	.	.	Glassel.
7	0	5	6	.	Red gravel, on clay.	Tonley.
7	1	5	6	180	Strong loam.	Leith Hall.
6	2	5	0	160	... ..	... ..
6	6	4	6	70	Poor soil.	Breda.
11	6	9	8	95	Deep rich alluvial soil.	Aboyne.
6	0	5	3	.	.	Birkhall.

The average annual increase at different ages is as follows:—

50 years	=	3.8 lines	(3 at Aden.)
70 ...	=	4.0 ...	(2 at Breda.)
160 ...	=	1.7 ...	(2 at Leith Hall.)
176 ...	=	2.6 ...	(1 at Philorth.)
180 ...	=	1.7 ...	(2 at Leith Hall.)

De Candolle stated, that, under favourable circumstances, the average annual increase *of the lime ought to be four lines.*

FRAXINÆ.—*Fraxinus excelsior.*—The Ash. This tree is of common occurrence in Aberdeenshire, and, provided it has a favourable soil, appears to thrive even at a considerable elevation. At Invercauld there are examples of it which can scarcely be exceeded by those in any other part of the county, and at an elevation exceeding 1300 feet; at Lloin Muich, near Ballater, there are several in a thriving condition.

This tree is generally among the latest to open its buds, and hence its young leaves are less liable to suffer from unfavourable weather in the season of spring, and this would seem to render it suitable for cultivation at elevations even higher than those alluded to.

TABLE X.—*Fraxinus excelsior.* THE ASH.

Girth at the soil.	Girth at 4 feet.	AGE.	SOIL.	LOCALITY.
Ft. in.	Ft. in.	Years.		
10 0	6 0	Above 60	Light mould, on ferruginous gravel.	Craibston.
12 0	7 3	120	...	...
10 4	9 10	.	Black loam on gravel and clay.	Ellon.
6 2	.	110	Sandy loam, on gravel.	...
11 7	9 6	.	Light soil.	Parkhill.
9 3	7 8	176	Clay loam, on clay.	Philorth.
7 0	6 4	60	Rocky bottom.	Aden.
5 6	3 2	45	Peat soil.	Kinmundy.
12 6	12 0	300	Clay subsoil.	Strichen.
7 8	6 6	60	Garden soil.	Echt.
13 2	7 8	.	.	Cluny.
9 8	.	.	.	Glassel.
13 0	9 6	70 to 90	.	Crathes.
15 9	9 5	.	.	Tonley.
11 10	9 3	200	Fine dry soil.	Leith Hall.
9 10	6 7	200	Black loam, rather wet.	...
	8 10	200	Black loam, on gravel.	Kemnay.
11 9	11 5	200 to 300	Alluvial soil, on clay and gravel.	Haughton.
5 0	4 8	70	.	Breda.
10 2	7 6	100	Rich clay loam.	Huntly.
12 7	9 0	.	.	Glenkindy.
9 7	9 0	100	Strong heavy soil.	Newe.
9 3	8 6	150?	Sandy soil.	Brakely.
5 0	3 9	80?	Debris of serpentine.	Lloin Muich.
8 0	6 8	.	.	(1347 ft.).
12 4	8 10	.	.	Birkhall.
13 4	10 7	150	Black loam, on gravel.	Abergeldie.
18 0	15 0	Above 200	Rich soil, on hard clay.	Invercauld.
10 1	9 10	Age?	...	Aboyne.
9 10	8 7	...	...	...

The mean annual increase at different ages is as follows:—

45 years	=	4.5 lines	(3 at Kinmundy.)
100 ...	=	4.04 ...	(3 at Huntly.)
100 ...	=	4.05 ...	(3 at Newe.)
150 ...	=	4.02 ...	(2 at Invercauld.)
200 ...	=	2.4 ...	(2 at Leith Hall.)
300 ...	=	1.7 ...	(3 at Strichen.)

The ash is generally of very rapid growth; this, however, does not render its timber less valuable, but rather the reverse; for Mr Campbell, an experienced timber-merchant here, informs me that the value is nearly directly as the rapidity of growth.

A section of an ash at Colquhonnies, in Strathdon, shewed 111 annual zones. Its girth at the soil was 9 feet 5 inches; the pith was rather eccentric. The following will shew the increase at different periods:—

Zones	1 to 10	=	1 inches.
...	10 to 20	=	2
...	20 to 30	=	2
...	30 to 40	=	1.5
...	40 to 50	=	1.25
...	50 to 60	=	1
...	60 to 70	=	1.25
...	70 to 80	=	1.12
...	80 to 90	=	1
...	90 to 100	=	0.8
...	100 to 111	=	1.8

A fine example of the ash in the vicinity of Aberdeen, which was planted on the day on which the battle of Culloden was fought, now measures nine feet four inches at six feet from the soil.

ULMACEÆ.—*Ulmus montana*.—The Scotch Elm. In none of the reports was any distinction made between the Scotch and English elm; the former, however, being common, and reaching considerable dimensions in this part of the country, it is probable that all the measurements had reference to it. This tree is often seen associated with the ash, sycamore, gean, and mountain-ash, near ruins and former seats of small proprietors, so numerous at one time. It is very general throughout the county; and if we may judge from the luxuriance of it at Invercauld, in the heart of the Aberdeenshire Highlands, and

exceeding 1000 feet above the sea, it would appear to be well fitted for cultivation in most districts.

TABLE XI.—*Ulmus montana*. THE SCOTCH ELM.

Girth at the Soil.	Girth at 4 Feet.	AGE.	SOIL.	LOCALITY.
Ft. in.	Ft. in.	Years.		
10 1	9 8	120	{ Vegetable mould, on ferruginous gravel. }	Craibston.
12 0	8 0	120	... ..	...
9 10	8 4	176	Clay loam, on clay.	Philorth.
11 6	9 6	100	Vegetable soil 7 feet deep.	Abbey of Deer.
8 0	7 8	.	.	Echt.
10 0	9 4	.	.	Cluny.
4 5	.	.	.	Glassel.
8 6	6 6	.	.	Tonley.
9 10	7 9	180	Strong brown loam.	Leith Hall.
4 8	3 8	39	Strong clay—much exposed.	... ..
9 1	7 2	70	.	Breda.
8 4	6 4	90	Rich clay loam.	Huntly Lodge.
7 0	5 9	.	.	Glenkindy.
7 6	7 4	100	Strong heavy soil.	Newe.
8 2	7 5	90	.	Edinglassie.
11 7	8 9	95	Deep rich alluvial.	Aboyne.
7 0	6 0	.	.	Birkhall.
11 10	7 5	150	Dry black loam, on gravel.	Invercauld.

The following exhibits the average increase at different ages :—

50 years,	=	4.8 lines,	(3 at Aden).
70	=	5.3	(2 at Breda).
90	=	3.8	(3 at Edinglassie).
100	=	3.02 ...	(3 at Newe).
150	=	3.5	(2 at Invercauld).
180	=	2.3	(3 at Leith Hall).

From these results it would seem that the elm increases considerably even at a great age.

The timber produced by elms of Aberdeenshire growth is stated to be of excellent quality, and worth 2s. to 2s. 6d. a foot.

ACERACEÆ.—*Acer Pseudo-platanus*.—The Sycamore. This tree is commonly called the Plane, in this part of the country. It is of very general occurrence in Aberdeenshire; large individuals occur in this vicinity, and I have seen some of considerable size near Castleton of Braemar, at an elevation exceeding 1000 feet.

TABLE XII.—*Acer Pseudo-platanus*. THE SYCAMORE.

Girth at the Soil.	Girth at 4 Feet.	AGE.	SOIL.	LOCALITY.
Ft. in.	Ft. in.	Years.		
11 4	6 8	120	{ Vegetable mould, on ferru- ginous gravel. }	Craibston.
7 9	6 2	.	Sandy loam, on gravel.	Ellon.
8 11	7 3	.	.	Aberdeen.
8 2	7 6	176	Clay loam, on clay.	Philorth.
7 0	5 0	100	Clay bottom.	Pitfour.
4 6	3 9	50	Rocky bottom.	Aden.
2 8	1 11	30	Peat soil.	Kimmundy.
9 6	6 4	.	.	...
8 2	7 9	90	Subsoil gravel.	Strichen.
8 10	.	.	.	Glassel.
.	10 0	.	.	Finzean.
12 0	9 0	70 to 90	.	Crathes.
8 6	7 0	.	.	Cluny.
14 5	9 9	.	.	Tonley.
12 8	9 9	300	Fine deep soil, on gravel.	Leith Hall.
11 6	9 3	200	Good loam, exposed.	...
.	6 6	.	.	Kemnay.
9 2	8 6	80	.	Breda.
11 7	11 1	.	.	Glenkindy.
8 4	8 2	100	Good soil.	Newe.
7 8	6 7	100	Strong heavy soil.	Edinglassie.
10 2	8 8	120?	Sharp light soil, on gravel.	Aboyne.
7 7	6 0	.	.	Abergeldie.
4 4	4 0	.	.	Corrymulzie.

The average increase is as follows:—

50 years	=	3.8 lines,	(3 at Aden).
100	=	2.5	(3 at Pitfour).
... ..	=	3.5	(3 at Newe).
... ..	=	3.2	(3 at Edinglassie).
200	=	2.2	(2 at Leith Hall).
300	=	1.8	(2 at Leith Hall).

It is stated that this species yields a saccharine juice in spring like the *Acer saccharinum* of America.

Its wood is about the same value as that of beech, but is not in great demand.

BETULACEÆ.—*Betula alba*.—The Birch. This beautiful tree is abundant in many parts of this county, becoming, however, more common in the interior, where it exists in a state of nature, and often attains a great size. I have seen it at an elevation of 2000 feet, but do not consider this as its absolute limits. Mr H. C. Watson, in his work on the geographical distribution of British plants, states, that he has seen it on

Ben Nevis at 3500 feet, and on the authority of Mr Winch, says, that, in the north of England, it is not found on the mountains higher than *Acer Pseudo-platanus*. It attains large dimensions at Invercauld and other places, where it is *natural*; frequently, however, it appears in the interior, on open moors, in the form of low stunted bushes, where, along with the juniper, it occupies the place of the whin and broom, which have disappeared.

Sir G. Mackenzie states, that, in an Icelandic forest, the most stately birch rises to the height of only 10 feet. Von Buch considers the birch to require a mean temperature above 26° F. He states, that, in Lapland, the line of birches is 1937 feet below the snow line, and 802 above that of Scotch firs. Wahlenberg gives 1950 feet for its limit under 68° N. Lat., the snow line being 3640.

TABLE XIII.—*Betula alba*. THE BIRCH.

Girth at the Soil.		Girth at 4 Feet.		AGE.	SOIL.	LOCALITY.
Ft.	in.	Ft.	in.	Years.		
7	0	5	0	50 to 60	{ Vegetable mould, on ferruginous gravel. Clay bottom.	Craibston.
6	0	5	0	100		Pitfour.
1	3	1	0	20	Peat soil.	Kinmundy.
5	10	5	2	70 to 90	Black mould, on clay.	Strichen.
7	4	6	0	.	.	Cluny.
		6	6	.	.	Finzean.
7	6	.	.	.	.	Glassel.
7	0	6	0	.	Gravel on clay.	Tonley.
5	3	4	9	.	Alluvial, on clay and gravel.	Haughton.
7	5	5	7	70	.	Breda.
6	6	5	2	.	.	Glenkindy.
5	2	4	4	100	Sharp dry soil.	Newe.
7	0	6	0	90	... ..	Edinglassie.
9	0	8	1	.	Deep rich soil.	Aboyne.
6	0	5	6	.	Dry sandy loam on gravel.	Ballater.
6	0	5	0	.	.	Birkhall.
5	7	4	10	.	.	Abergeldie.
3	6	3	2	.	.	Loch Muich.
13	0	{ 6 6 }		200?	.	Invercauld.
		{ 5 8 }			.	
9	0	6	2	.	.	.....
7	6	6	2	.	.	Clabochie (Braemar).
8	8	8	2	.	.	Craggan (Braemar).

The annual average increase at different ages is,—

- 20 years = 2.6 lines, (3 at Kinmundy).
 70 = 4.8 (2 at Breda).
 90 = 3.1 (3 at Edinglassie).
 100 = 2.3 (3 at Pitfour).
 = 2.08 ... (3 at Newe.)

On reviewing the table it would seem that the size attained by the birch becomes greater on passing inland. There can be little doubt that it is exceedingly liable to be affected by differences of soil and climate. It would be interesting to know the exact age of the large example at Invercauld; on the supposition that it is 200 years, this would give an annual mean of 2.9 lines.

Although scarcely worthy of being ranked as a tree, it may be deserving of notice that the *Betula nana*, Dwarf Birch, is exceedingly abundant in the higher districts, its lowest limit being 1600 feet, and reaching nearly 3000; I possess a stem of this plant four-tenths of an inch in diameter, and having 14 annual rings.

Alnus glutinosa.—The Alder. This tree attains about 1500 feet of elevation in Aberdeenshire, and occurs also near the sea-level. The finest examples I have seen, are at Castleton of Braemar, on the banks of the Water of Cluny, at an elevation above 1000 feet.

TABLE XIV.—*Alnus glutinosa*. THE ALDER.

Girth at the soil.	Girth at 4 feet.	AGE.	SOIL.	LOCALITY.
Ft. in	Ft. in.	Years.		
6 5	6 2	70 to 90	Deep black soil, on clay.	Strichen.
5 6	4 2	.	.	Tonley.
8 2	7 5	.	Alluvial, on clay and gravel.	Haughton.
6 3	4 10	70	Poor soil.	Breda.
5 4	4 9	90	Marshy clay.	Huntly Lodge.
8 6	5 9	60 to 70	Sandy.	Invercauld.
8 1	5 0	...	...	...
7 9	5 0	...	...	...

The mean annual growth is—

70 years, = 4 lines. (2 at Breda.)
 90 ... = 2.4 ... (3 at Huntly.)

“ At Echt, the alder seems to have covered all the low grounds at a former period. At present, it thrives well for 20 years, and comes to sizes fit for useful purposes.”

The wood, from its colour, is usually called Scotch mahogany, and is stated to afford superior material for piles.

POMACEÆ.—*Pyrus aucuparia*.—The Rowan. This tree is

very common in Aberdeenshire, from the sea-level, where (and generally over the lower districts), it has been planted, to an elevation of at least 2000 feet. I have seen it on the Pannanich cliffs at 1600 feet, associated with *Quercus robur*, *Betula alba*, and *Populus tremula*, all the four being natural trees. In Forfarshire, Mr Watson has seen it at an elevation of 2500 feet.

TABLE XV.—*Pyrus aucuparia*. THE ROWAN.

Girth at the soil.	Girth at 4 feet.	AGE.	SOIL.	LOCALITY.
Ft. in.	Ft. in.	Years.		
4 3	3 11	70 to 90	Black mould, on clay.	Strichen.
6 6	4 7	65	Good deep soil.	Leith Hall.
4 0	3 8	39	Gravel subsoil.	...
5 0	4 8	20?	Poor soil.	Breda.
5 0	4 4	100	Sharp dry soil.	Newe.
7 1	6 3	90	...	Edinglassie.
6 6	4 9	.	.	Dee Castle.
4 8	4 1	.	.	Glen Muich.
6 5	4 10	.	.	Abergeldie.
7 8	5 0	.	.	Glen Gairden.
7 0	5 7	70 to 80	Hard gravel, on rock.	Invercauld.

Mean annual rate of increase—

65 years,	=	3.8	lines.	(2 at Leith Hall.)
90 ...	=	3.4	...	(3 at Edinglassie.)
100 ...	=	2.04	...	(3 at Newe.)

This tree bears fruit copiously in all parts of the county.

Cratægus oxyacantha.—The Hawthorn. I have not been able to ascertain the upper limit of this in Aberdeenshire. Mr Watson states that it rises somewhat higher than the common whin, viz. to 1300 feet.

TABLE XVI.—*Cratægus oxyacantha*. THE HAWTHORN.

Girth at the soil.	Girth at 4 feet.	A E.	SOIL.	LOCALITY.
Ft. in.	Ft. in.	Years.		
5 0	3 9	100	Vegetable mould.	Aberdeen.
4 9	3 7	.	.	Cluny.
4 8	4 0	.	.	Tonley.
4 6	3 4	180	Dry brown mould.	Leith Hall.
4 4	4 2	...	...	...

One near Aberdeen, 1 foot 8 in. girth, at the soil had 28 annual rings, which were of very uniform thickness.

The hawthorn being usually planted to form hedges, seldom, under such circumstances, reaches any great size. Planted singly, however, and in good soil, it often attains considerable dimensions, and lives to a great age.

AMYGDALÆÆ.—*Prunus Cerasus*.—The Cherry and Gean. In the reports received respecting this species, no reference was made to the different varieties of it; this is, however, probably of little importance. It is of general occurrence in Aberdeenshire in gardens, or where these formerly existed. There are few places (perhaps none) where it can be considered truly wild. It attains considerable dimensions, even in places where few trees of any kind now exist, as at Dalphad in Glen Gairden. According to Mirbel, its cultivation ceases in Russia beyond 55° and 56° N. lat. Malte Brun states, that cherries sometimes ripen on the coasts of E. Bothnia, 63° to 64°. In Norway, it produces fruit to 63° N.

TABLE XVII.—*Prunus Cerasus*. THE GEAN.

Girth at the soil.	Girth at 4 feet.	AGE.	SOIL.	LOCALITY.
Ft. in.	Ft. in.	Years.		
7 0	6 3	100	Deep vegetable soil.	Abbey of Deer.
5 6	5 0	70	Loam, on gravel.	Strichen.
6 0	5 3	.	.	Echt.
7 8	6 0	70?	{ Vegetable mould, on ferruginous gravel.	Craibston (near Aberdeen).
9 6	6 8	.	.	Cluny.
9 8	6 11	.	.	Tonley.
2 5	2 0	25	.	... (cherry).
7 0	5 2	180	Sandy loam.	Leith Hall.
4 4	4 0	30	.	Breda.
9 9	7 4	100	Rich clay loam.	Huntly Lodge.
4 3	4 1	100	.	Newe.
8 0	7 6	90	.	Edinglassie.
5 5	.	40	Light sandy soil.	Ballater.
7 0	5 2	.	.	Dee Castle.
7 7	.	.	.	{ Dalphad (Glen Gair-
6 10	6 2	.	.	{ den, 1500 feet?).
			.	Birkhall.

Mean rate of increase—

25 years,	=	4.4	lines.	(1 at Tonley.)
70 ...	=	3.5	...	(1 at Strichen.)
90 ...	=	3.8	...	(3 at Edinglassie.)
100 ...	=	4.2	...	(3 at Huntly.)

An example of this tree in the vicinity of Aberdeen, 4 feet 5 in. in girth, at the soil had 35 annual rings; the proportion at different periods was—

Zones 1 to 10, = 2.5. inches.
... 10 to 20, = 2.5.
... 20 to 30, = 2.75.
... 30 to 35, = 1.

Prunus spinosa, the Black Thorn or Sloe, occasionally attains a considerable size; for instance, one at Crathes measures in girth at the soil $6\frac{1}{2}$ feet, and at 4 feet up, $4\frac{1}{2}$ feet. It most usually, however, assumes a stunted, bushy form.

SALICACEÆ.—*Populus tremula*.—The Aspen. This tree is of frequent occurrence in Aberdeenshire, especially in the interior, where it is in a state of nature. It has been seen by Mr Watson at an elevation of 1600 feet in Braemar, but I believe it is found even higher than this. It occurs in the whole of the South of Europe, Asia Minor, Armenia, Caucasus, and Lapland, to the Frozen Ocean. It is abundant in Russia, from the Baltic to Lena, beyond which it is rare, reaching, however, to 62° N.

TABLE XVIII.—*Populus tremula*. THE ASPEN.

Girth at the soil.	Girth at 4 feet.	AGE.	SOIL.	LOCALITY.
Ft. in.	Ft. in.	Years.		
5 9	5 0	.	.	Glenkindy.
4 4	3 4	.	Sandy loam.	Ballater.
3 4	3 0	27	.	Edinglassie.
10 6	6 10	150 to 200	Hard gravel.	Invercauld.
OTHER SPECIES OF POPLAR.				
3 9	3 0	50?	Rocky bottom.	Aden (Lombardy).
5 3	4 11	70 to 90	Gravel subsoil.	Strichen (Black poplar).
4 1	3 9	...	...	... (Lombardy).
11 2	8 6	.	.	Tonley (Hoary poplar).
7 3	7 1	67	Black wet soil.	Leith Hall (Black poplar).
6 0	4 8	45	Clay and gravel.	... (Lombardy).

Salix alba.—The White Willow, &c. Few of the reports alluded to the particular species of which measurements were taken. The Huntingdon or White seems, however, the most common in this part of the country which reaches any great size.

TABLE XIX.—*Salix alba*. THE HUNTINGDON WILLOW.

Girth at the soil.	Girth at 4 feet.	AGE.	SOIL.	LOCALITY.
Ft. in.	Ft. in.	Years.		
6 4	5 5	176 ?	Clay loam, on clay.	Philorth.
6 2	5 7	50	Rocky bottom.	Aden.
9 0	8 4	.	Sour clay subsoil.	{ Echt (<i>Salix alba</i> , Hun-
6 0	5 1	39	Damp clay.	tingdon.)
7 3	{ 5 10 } { 4 3 }	.	.	Leith Hall.
5 0	4 8	27	.	{ Glenkindy (Huntingdon
5 3	5 0	.	.	willow.)
				Edinglassie.
				Birkhall.

This species is of very rapid growth. An example of it—in a garden in this vicinity—was planted 21 years ago, and now measures in girth at the soil 3 feet 9 in.; another, in the same place, 17 years old, has a girth at the soil of 3 feet 7½ in. The first of these is growing in hard gravel; the last, in rich garden soil resting on gravel.

JUGLANDEÆ.—*Juglans regia*.—The Walnut. This tree is not very frequent in this part of the country. Under favourable circumstances, however, it is capable of attaining considerable size.

TABLE XX.—*Juglans regia*. THE WALNUT.

Girth at the soil.	Girth at 4 feet.	AGE.	SOIL.	LOCALITY.
Ft. in.	Ft. in.	Years.		
6 0	4 2	60 to 70	{ Vegetable mould, on ferru- ginous gravel. }	Craibston.
	3 7	.	Peat and sand.	Kemnay.
	4 1	.	...	...
7 0	5 6	70 to 90	.	Crathes.
3 4	.	.	.	Glassel.

At Huntly Lodge, there is one about 100 years old, growing in rich clay. Its girth at the soil is 6 feet 6 in.

HIPPOCASTANÆ.—*Æsculus Hippocastanum*.—The Horse Chestnut. This tree appears to find a soil and climate suited to it in several parts of Aberdeenshire, and that even at a considerable elevation, as at Invercauld.

TABLE XXI.—*Æsculus Hippocastanum*. THE HORSE-CHESTNUT.

Girth at the soil.	Girth at 4 feet.	AGE.	SOIL.	LOCALITY.
Ft. in.	Ft. in.	Years.		
9 6	7 1	90 to 100	{ Vegetable mould, on ferru- ginous gravel. }	Craibston.
8 6	7 0	.	Rich garden mould.	Pitfour.
9 5	6 8	.	.	Balfing.
12 6	9 0	70 to 90	.	Crathes.
12 7	7 9	140 to 150	Black loam, on hard gravel.	Invercauld.

AQUIFOLIACEÆ.—*Ilex Aquifolium*.—The Holly. There are few situations in this county favourable to the growth of this plant. It seldom attains any great size, especially near the sea; more inland, however, it appears to thrive better. Mr Watson alludes to its occurrence at 900 feet of elevation, at Loch Eil, Argyleshire. It occurs in Western and Eastern Asia, and, according to Wahlenberg, is a doubtful native of Sweden.

Dr R. Brown, when on a visit to Aberdeen in September last, stated, that in Germany it is treated as a greenhouse plant.

TABLE XXII.—*Ilex Aquifolium*. THE HOLLY.

Girth at the soil.	Girth at 4 feet.	AGE.	SOIL.	LOCALITY.
Ft. in.	Ft. in.	Years.		
4 0	3 10	120?	Light black loam, on gravel.	Ellon.
5 0	.	.	.	Midmar.
4 6	3 6	70 to 90?	.	Crathes.
6 4	5 9	.	.	Blackhall.

The finest examples of it are to be seen in the neighbourhood of Upper Banchory. There is, on the south side of the garden of Finzean, a hedge composed of this plant. Its length on each side of the avenue to the house is 70 yards, the height being 10 feet, the breadth 8 feet. In the woods of Glassel, thousands of young plants spring up naturally.