DENDROLOGIA;

OR, A TREATISE OF

FOREST TREES,

WITH

EVELYN'S SILVA

REVISED, CORRECTED AND ABRIDGED;

By a Professional Planter,

AND COLLECTOR OF PRACTICAL NOTES FORTY YEARS.

This Work will be found useful and entertaining

TO NOBLEMEN, GENTLEMEN, LAW-STEWARDS, LAND-STEWARDS, PLANTERS IN GENERAL, AND LANDSCAPE GARDENERS:

As it comprises the

SEMINARY, NURSERY, TRANSPLANTING, TRAINING, THINNING, PRUNING, FELLING, MEASURING, VALUING, SELLING, CONVERTING,

AND FINAL DECOMPOSITION BY AGE.

DRY-ROT, &c.

BY J. MITCHELL, F. J. B. S. & M. N. A.

Keighley:

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M DCCC XXVII.

Entered at Stationers' Hall.

DEDICATION.

TO the Immortal Shades and Manes of MESSIEURS JOHN EVELYN, NEHEMIAH GREW, *and* STEPHEN HALE. *You were illustrious Fellows and first Members of the Royal Society: your Works are standards.—The works of Almighty God are not changable, as are the works of man. The growth of Trees varies not: were there a good Alphabetical Index made to* EVELYN'S SILVA, *by one who knew what to take in, and what to reject, so as to enable the reader to turn to the subject wanted, it would be the most valuable work on Trees, at this day extant.*

The above works, with that of the subsequent JOHN HILL, M. D. *have served me as lights, by which I found my way to the Wood, and for which I most gratefully subscribe myself*

YOUR

GHOSTSHIPS'

Debtor and Humble Admirer,

RURAL RUSTICUS.

Oldfield House, Keighley,

17th FEB. 1825.

ADVERTISEMENT.

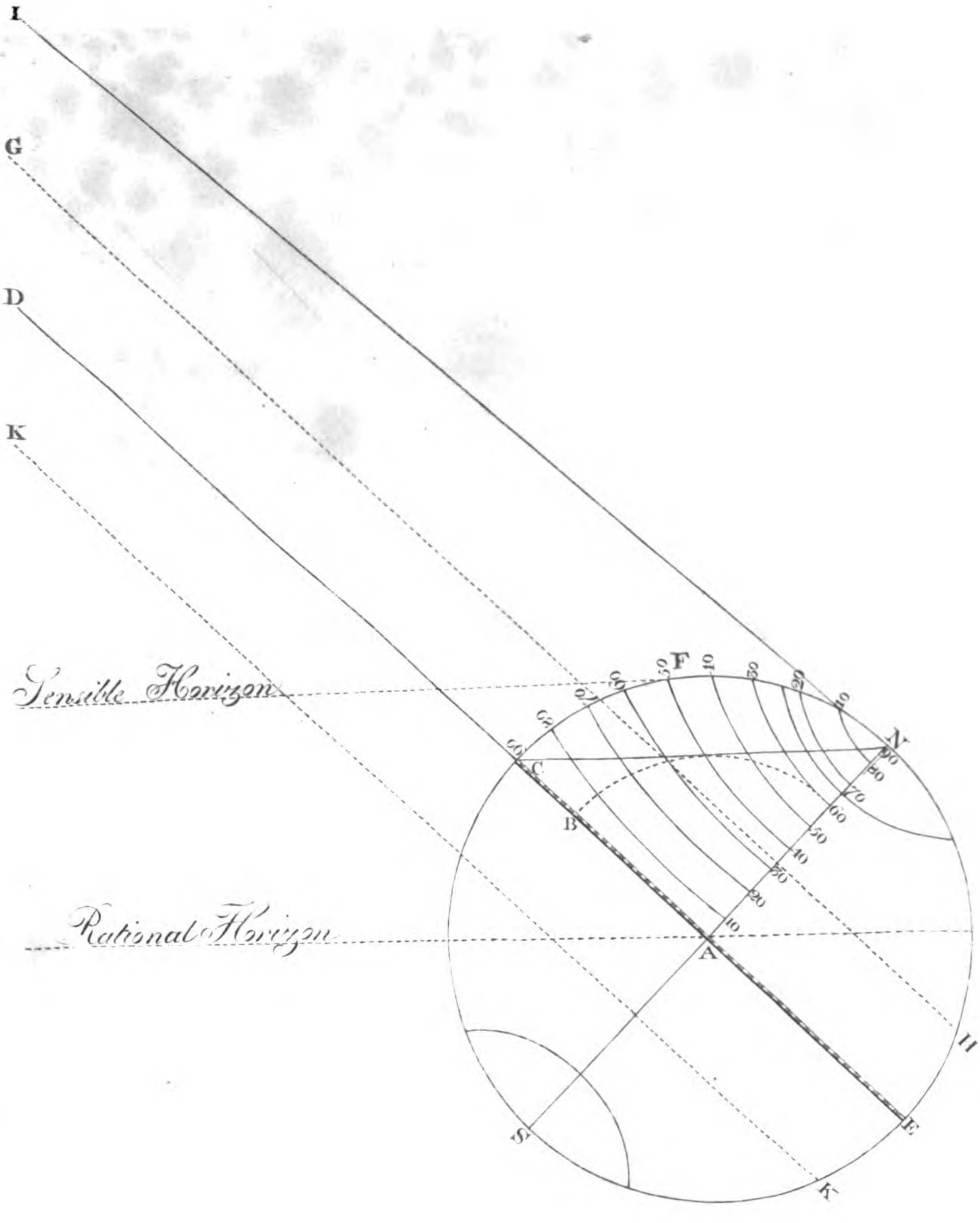
MR. EVELYN said he did not write for ordinary rustics, mere foresters and woodwards:—DR. DODDRIDGE said he did not write for the learned, but for the ignorant:—DR. HUNTER said he did not write for the ignorant, but for the learned; he created a large Jordan; I had the misfortune to fall into it, and in wading through, I met with many mutilated fragments from EVELYN'S SYLVA, floating therein; but the mass was nothing but slops:—I write for the *inquisitive*, who read for information on rural affairs.

I have not described any wood or tree, but what I have actually surveyed and measured, except in two or three instances, and there I have given a reference to my author. Therefore the work is genuine and authentic, free from plagiarism, but not free from errors. The way to the wood is various and intricate, on account of soil, situation and climate. That few authors, when compared, agree; so differently does the same object paint itself to our imaginations; and those images are generally warped in the drawing by prejudice,—generated by our own narrow ideas. On that account, I hope my kind and indulgent readers will weigh, measure, compare and think for themselves.

Thus a planter accustomed to CHALK DOWNS, on the southern coast and western side of Yorkshire, knows the value of shelter, whilst the planter that has been accustomed to midland and eastern counties, will smile reading MR. PONTEY'S account of shelter: although as necessary in the above districts and western coast, as shelter for man and beast. Hence the necessity of thinking on the part of the reader, to discover the nature of the soil, situation and climate, so as to adapt his plants thereto. By so doing, he may with confidence anticipate ultimate success.

It is generally admitted that the temperature of the earth at ten feet deep, is equal to the latitude under which it lies; counting from the north pole, southward. The first twelve degrees round the pole is eternal or perpetual ice: from twelve degrees to Artic Circle, at twenty-three and a half degrees, where there is land, it produces little besides litchens: and from thence to thirty-two degrees, which is the freezing point, their woody plants are but shrubby bushes; their summers are too short to produce trees, as they have frosty nights all the year round.—From thirty-two degrees to fifty degrees produces the best oak and fir in the world, for closeness of texture, strength and durability; namely, Great-Britain, Ireland, Holland, part of Germany, Sweden, Denmark, and part of Russia, and North America that lies under the same parallel of latitude, viz. New Britain and New South Wales. All timber grown south of fifty degrees, by reason of the warmth of the climate, grows too gross to stand in competition with the northern timber, except a few places on mountains, which are elevated to a British climate, and which I have further elucidated by the annexed diagram:

Let S A N be the axis of earth, and D A E the equator; this shews that the equator at C, is level with the north pole N, by the cord line C N. From A to B are 2818 miles; and from B to C 1182 miles, which proves that the segment of the sphere above the line C N, is 1182 miles thick, and that the sun must be an amazing height at our midsummer in the Tropic of Cancer G H, before it can dart its rays


I
G
D
K
Sensible Horizon
Rational Horizon
F
N
C
B
A
H
E
S
K

down the tangent I N upon the north pole; then their longest day is 23 hours, and night 1 hour of twilight. The sun at 12 o'Clock is vertical in Arabia, East India, China, Barbary, Egypt, &c., when it is our midsummer, and one of their winters at the equator, which is as warm as their midsummer is in Switzerland, Austria, France, Germany, and Canada in America. When the sun is in the Tropic of Capricorn K K, it is our christmas.

By inspecting the diagram, and observing the following remarks, some light will be thrown upon what are termed climates. The axis of the earth is elevated to an angle of forty-five degrees above the rational horizon, consequently the sun's rays, even at midsummer, reach all those parts north of F, or sensible horizon, in a very oblique direction. MR. EVELYN says, that trees grow in the south to be giants, whilst those of the north are pumilas or dwarfs. I suspect that the metallic substance, or pabulum of wood, rises in the watery vehicle, called vapour, in elevation, according to the power of the sun, by which the height of trees is governed. MR. GUTHERIE tells us that pines grow near the equator from fifty to seventy feet clean stems, and frequently thirty-six feet in circumference. I wish he had favoured us with the total height.

The Andes, mountains near Quito, in Peru, are stated to be twenty-one thousand four hundred and forty-five feet high, perpetually snow capped. Suppose the cap comes down three thousand four hundred and forty-five feet, there is a remainder of eighteen thousand feet in this torrid zone. Now as there are ninety degrees from the equator to the frigid zone at the north pole, which has no elevation to freezing point, eighteen thousand divided by nine, gives two thousand feet.

Degrees.		Altitude or Freezing point.
00	North Pole or Zone of Barrenness	0000
10	North Sea elevation to do.	2000
20	Lapland do.	4000
25	Iceland, Mount Ecla 5000 feet high	5000
30	St. Petersburg and Kamschatka 2 degrees below frost	6000
40	Penzance in Cornwall	8000
45	Alps, Mount Blanc 15630 feet high; this is in the centre of the temperate zone, with its head eternally invested in frost 6630 feet down	9000
50	Madrid, in Spain	10000
60	China, and Georgia, in North America	12000
70	Mexico and New Spain, in do.	14000
80	Island of Trinidad, Abyssinia, and Philippines	16000
90	Quito in Peru, under the Equinoctial line	18000

According to this theory we have no mountains in England that rise within four thousand feet of permanent winter. Ben Nevis in Scotland, wants two thousand two hundred and twenty feet.

The following is a list of the highest mountains situate between the equator and the north pole, with their respective heights and latitudes; so that by the annexed table it may be seen how much under, and how much over the line of frosty region each is.

TABLE

No.	Names of Mountains.	Latitude, degrees	Longitude. degrees	height in feet.	Feet in Frosty region	Feet under Frosty region
1	Abyssinia..............	N. L. 8	E. L. 40	14000		1600
1a	Source of Nile in do.			10000		5600
2	Adam's Peak.........		80	6400		9600
3	Mount Atlas..........	27	5	12500		100
4	Peak of Teneriff	28	17	15390	2590	
5	Himalayah Mounts..	30	85	26862	14862	
6	Mount Ida.............	35	22			
7	White Mountains......	35	21½			
8	Mount Ætna..........	38	14	10946	546	
9	Mount Olympia.......	40	27	6135		3865
10	Mount Ararat.........	40	50	12700	2700	
11	Mount Libanon.......	40	40	9526		474
12	Mount Sierra..........	37	W. L. 5	11801	1201	
13	Mount Perdu.........	43	1. 20	11265	1865	
14	Washington Peak.....	45	70	6225		3775
15	Apennines.............	46	E. L. 13	8791		1009
16	Mount Blanc..........	47	8	15630	6030	
17	Lumnitz Peak	48	23	8458		942
18	Snowden Hill....... ...	53	W. L. 4	3571		3829
19	Scafell,Cumberland...	54	3	3240		3960
20	Mt. Scheenechattan...	55	E. L. 15	8114	1114	
21	Volcano, Kamschatka	57	160	9000	3400	2220
22	Ben Nevis..............	57	W. L. 5	4380		
23	Mount Elias............	60	130	17840	11840	
24	Mount Hecla..........	65	15	5000	*in line*	*in line*
25	Captain Ross, 1818...	74	65	4000	do.	do.
26	Mount Parnassus......	80	E. L. 5½	3955	1955	

The Source of the Nile is in a marshy vale, between two very high mountains; (*No.* 1 & 5) The Barometer stood at twenty-two inches.

No. 5. DR. BREWSTER'S Journal of Science, says that G. GOVAN, M. D. found at eight thousand feet high something like an European climate, as he could bear the heat most of the day in the open air. Here ends the region of exotic plants, and here begins the more hardy species. Forest trees of the first rate have their region to twelve thousand feet altitude, where snow may be found in the deep gulfs all the year round; and I should imagine, that as their nights are long, they are frosty all the year. From this region to fifteen thousand feet, are all sorts of

Alpine and Siberian Plants; hence to sixteen thousand seems to be the limit of perpetual snow. It is allowed to be nearly as hot under the Tropics as under the Equator; therefore my line of climates cuts this mount three thousand five hundred feet too low. The average will be eleven thousand three hundred and sixty-two feet in perpetual winter, and if ever ZERO is found, it will be here above the ***Himalayah Mountains.*** N. L. 30 degrees.

No. 6 & 7. With most of the Grecian mounts I pass, not having any other elevations than those given by SIR ISAAC NEWTON, professor of Mathematics at Cambridge, printed in 1681. They are made to be so very high, that I dare not risk my veracity by copying them, or I should have felt much pleasure in stating the elevation of the Fount of Helicon's Streams, and the beds of Parnassus' Flowers, so celebrated by poets; as I endeavour to make this work amusing as well as useful.

No. 8. Mount Ætna, in Sicily, would be capped with snow continually, but for the exhalations from the crater. The base of Ætna is said to be fifty miles in diameter. Three miles' rise in twenty-five is not a steep ascent. Derby Peak and the Peak of Teneriff, are not so steep as some of our Yorkshire mountains. MR. BRYDONE says, that the first fifteen miles are in a fertile region: he gave two and a half Inches fall of mercury, or 3000 feet perpendicular.

Then 9 miles in a woody region		8000	do.	do.
Then 4	do. in alpine plants	1340	do.	do.
Then 2	do. in snow	660	do.	do.
30 Miles to rise........................		13000	do.	do.

So that my line here cuts the mountain at one thousand nine hundred and forty feet too low, supposing his elevation to be correct, which I doubt, since no two accounts of any elevations of high mountains agree; some give elevation above sea, others at the base of seventy miles diameter, others again at fifty miles diameter.

No. 14. Washington Peak and the south side of the Swiss Alps are just in the temperate line of forty-five degrees; and no timber grown south of that is so good as that grown on the north side, except a few places that are elevated, so as to have the same climate. York is in latitude fifty-four degrees north, which is seven thousand two hundred feet under the frigid zone; and the moors in the West Riding are from one thousand five hundred to one thousand six hundred feet high. Take one thousand five hundred from seven thousand two hundred, and the remainder is five thousand seven hundred feet, to freezing point; which throws us into the same climate as St. Petersburg, Archangel, Norway, and Sweden. Should not this be a stimulus to plant our moors and monntains? for the best timber is grown in these northern climates.

M. SAUSSURE says, when a balloon has ascended seven thousand eight hundred feet, it is in the line of perpetual snow at Paris, the thermometer at thirty-two degrees.

MR. W. W. GREEN found the freezing point at Leeds, on the 5th of September, 1823, at nine thousand one hundred and fifty-two feet. This great elevation is easily accounted for, by taking into account, the vast number of develent furnaces in Leeds.

GARNERIN'S balloon rose to thirty-two degrees, or freezing region at six thousand four hundred and five feet, at Bath, in Somersetshire; this is below my freezing line, and proves to be nearer the truth than any of our English Aeronauts' accounts. They have published their remarks in such a slovenly manner, that nothing certain can be extracted from them. M. GARNERIN ascended from Sydney Gardens, Bath, on the 7th of September, 1802; the day was so fine and calm, that his balloon ascended to its utmost height, in a perpendicular line, where I saw it nearly stationary for more than an hour. His account was in the Bath paper, as follows, viz.

	barometer. Inches	Thermometer.	Feet high.	Feet per inch of the Mercury.
Mr. Garnerin's ascent from Sidney Gardens, Bath, on the 7th of September, 1802	30	62°	0000	
	26	52°	3420	855
	$24\frac{3}{4}$	43°	4494	856
	$23\frac{10}{100}$	36°	5420	561
	22	32°	6405	895
Mr. Green's, at Portsea, on the 6th of September, 1821	29. 7	72°	0000	
	20. 5	38°	10000	1087
Mr. Green's, at Leeds..................				1200
Mr. Saddler gives				2000
Mr. Garnerin, at Ranelagh, London				820

Dr. Darwin says there are four strata in the Atmosphere. Was the 561 in one of the strata? I am inclined to think it is an error either of Mr. Garnerin's or mine, made in the fractions.—How are these differences to be reconciled?

Mr. Ferguson has given us a table, calculated from Sir George Shuckburge's Barometrical and Sectoral Survey of Mount Ætna, which proves the barometer to be sixteen inches in every hundred feet, under the sectoral and spirit level heights.

TABLE.

First column is the sectoral Heights.

Second column is the fall of mercury in inches and hundred parts.

Third column shews how many feet rise to every inch, and hundred parts of an inch fall of mercury. It also proves, that Sicilian air is 13 per cent. lighter than British air.

Sectoral elevation. FEET RISE.	Fall of mercury in Barometer.	Rise in feet to inches fall of mercury.
100	0—11	......
200	0—22	......
300	0—33	......
400	0—44	......
500	0—54	......
600	0—65	......
700	0—76	......
800	0—87	......
900	0—98	......
1000	1—09	917
2000	2—14	955
3000	3—15	990
4000	4—02	1033
5000	5—04	1087
6000	5—94	1100
7000	6—80	1162
8000	7—63	1204
9000	8—43	1250
10000	9—20	1298
11000	9—94	1369
12000	10—66	1389
13000	11—36	1428
14000	12—04	1470
15000	12—70	1515
16000	13—34	1562
17000	13—96	1612
17000	14—57	1639

I added the third column in order to shew the decrease in weight of atmosphere progressively, to every inch fall of mercury; and by adding the first and the last numbers together, the mean or average will be one thousand two hundred and seventy-eight. Suppose it possible to elevate the barometer until all the silver run out, then the double of fourteen inches and fifty-seven parts, gives twenty-nine inches; and the one thousand six hundred and thirty-nine will be the average per inch. One thousand six hundred and thirty-nine multiplied by twenty-nine, gives forty-seven thousand five hundred and thirty-one feet, for the height of the atmosphere, which I conceive to be a kind of halo, formed by exhalations of gas, from the earth. What there is above, and whether it has any weight, we shall learn, when we become acquainted with the inhabitants of the moon. But was it not for our atmosphere, I believe we should see the stars by day, in the ethereal blue sky, which appears so transparent between the clouds sometimes. For MR. BRYDONE says he saw the stars in clusters from the top of Mount Ætna.

This table shews, that if the barometer scale, at sea level, be in its proper place, at twenty-eight inches from the surface of mercury at the bottom, to the bottom of the scale, that a barometer to be fixed at one thousand feet above sea level, should have the scale fixed at twenty-seven inches, and so on for any greater or less elevation;—this for Sicilian atmosphere: and for England one thousand and thirty-six feet rise for every inch fall of mercury, viz. one hundred and three feet to a degree, at one thousand feet above the sea, measured by the spirit level, both up and down, then by the barometer in February, and again in July, each time proved alike by my own experiments.

MR. GREEN says, at Leeds, on the 9th of June, 1825, only eight hundred and sixty-six feet per inch. (See page tenth and Leeds Mercury,) for his balloon account.

Meteorological Journal, kept by the Leeds Philosophical Society, for July, 1825.—This shews that the barometer was once at thirty inches and two hundred and seventy-five parts, while mine was never above twenty-nine inches and three hundred and seventy-five parts, leaving a difference of nine hundred parts; which proves my House to be nine hundred and thirty-two feet higher than the Society's Room, at Leeds. Suppose both the barometer scales be at twenty-eight inches; Leeds is one hundred feet above sea, consequently, their scale is one hundred too high, and mine one thousand, or one inch too high; or one thousand and thirty-six feet. Thus it is evident, that if two barometers were constructed exactly alike, and one placed at sea level, and the other upon a higher site, a journal of their diurnal movements, for a few weeks, would give the elevation above sea.

By these vertical mercurial levels, and by the indefatigable exertions of BRYDONE, SHUCKBURGE, GOVEN, WEST, EVANS, &c., we are not only made acquainted with the principal mountains all over the world, and their elevations, but with their mineral and vegitable productions; and with their vertical and horizontal climates, which is the key to the planter's knowledge; and with the assistance of DONN'S Catalogue, printed at Cambridge, he will be enabled to collate his trees according to the climate he has to plant in; which is always as arbitrary as the soil. This, to a superficial reader, may seem superfluous; but who are so much interested in climates as the planter and agriculturist, who have to stock the ground, so as to paralyze the climate?

The frigid zone produces little besides litchens, fish, and bears for sustenance. The happy temperate zone produces every thing necessary for man; and the throwing off his coat in summer, or putting on an extra one occasionally in winter, renders him comfortable at all seasons; whilst the torrid zone produces little besides luxuries; and the climate intolerable all the year, (except on mountains at ten to fifteen thousand feet high, corn and European trees grow.) WALKER'S American Buccaniers says that at the equator, they harvest three crops of oil and wine annually. We know they have two summers, the middle of each is at the vernal and autumnal equinoxes, and their winter, if winter it can be termed, is at our midsummer and christmas, and must be hotter then than at Orleans, on the 21st of June, as the sun's altitude at Orleans in France and at the equator is equal at our midsummer. *Look up, thou Atheist! and see if chance ever formed any thing so tangible, yet incomprehensible to all but God and his attributes; to whom make supplication for forgiveness of thy infidelity.*

As it is proved by mountains and aeronauts that a frosty region exists at nearly a certain elevation; from which it may fairly be inferred, that, when the clouds rise so high in serene weather, as to interfere with the frosty region, that the watery particles are condensed into hail—Hence the tremendous hailstones so frequent in summer time, and I suspect the frosty region is the dew point sought by Mr. Dalton.—Zero must be infinitely higher.

Your's respectfully,

AN

Ignorant Philosopher.

INTRODUCTORY PREFACE

To the Reader,

Who will naturally wish to know something of the Author's pretensions for writing.

I WAS born in the City of London, in 1762, of Yorkshire parents, and having a weak constitution, I was sent, when young, to be reared in Yorkshire, in the Vicarage of Halifax. I served a regular Apprenticeship to a Nurseryman and Planter, in the West-Riding. In 1786, I returned to London, and served a kind of Novitiate four years, at the dismantling of ENFIELD CHACE, in Middlesex, which had been previously allotted as under.

	A.	R.	P.
King's Allotment	3859	2	20
Enfield do.	1532	2	6
Edmonton do.	1231	2	6
South-Mimes do.	992	3	36
In lieu of Tithes do.	672	1	32
Roads & Locals do.	219	0	37
Hadley do.	216	0	00
Total	8724	1	17

Upon this Chace grew first rate Oak, Beech, and Hornbeam, upon a strong clayey soil, upon a substrata of Chalk, which is the best of all others for Oak. This Chace Timber was wonderfully contrasted by Oak, Beech, Fir, and other cultivated Timber Trees, (at the three

Royal Lodges thereon, and the neighbouring seats of gentlemen and opulent merchants of London,) drawn up straight and tall, which gave me the first idea of Close-planting, Thinning, and Pruning.

In order to cultivate these ideas, I entered into the service of MESSRS. EAMES and WEBB, Professional New-ground Workmen, and Landscape Gardeners, with whom I spent eleven years as one of their foremen, at Fawsley, Northamptonshire; at Frampton, Dorsetshire; in Somersetshire, near Bath; and at Houghton-hall, Shropshire. I was then invited to take the stewardship of STANSTED, in Sussex. The whole estate was so much dilapidated, that many of the farm buildings I had to take down and re-build. I had the management of one hundred and nineteen acres of meadow, one hundred and thirty-five of arable, five hundred and thirty-seven of park pasture, one hundred and eighty-two and a half of common, (which I made into fields and plantations,) one thousand four hundred and forty-six of wood land, nine hundred of which was forest land, part of it ruined by cattle belonging the borderers: this I inclosed and divided into two farms, containing together two hundred and ninety-one acres, and erected suitable buildings thereon. Besides the building repairs on seven farms and sixty cottages that were dispersed upon one thousand five hundred and sixty acres more, I received rents, paid all bills, did all the marketing, marked all timber to be fell'd, measured all that was fell'd, to the amount of two thousand a year:—I drew all the plans for the farms and farm buildings, and superintended their execution, without any assistance in writing or even a messenger, and in less than seven years I got the whole completed, roads and fences all good, and not a gate wanting upon the whole estate.

This has nothing to do with planting, but it will serve to shew what may be done under a good system of discipline by an active agent, when his arrangements are not broken in upon. I acted under a sound and wise head, that was too sensible of her own dignity ever to be degraded by placing herself between me and those I had to deal with: she was always easy of access, and steady in communicating her orders. Whoever place themselves between their agent and his patients, draw a sluice that inundates the whole estate with anarchy and confusion;—which destroy all subordination, not only among labourers, but among the tenants and trades-people, and create an abundant harvest for pettifoggers.

Thus I have endeavoured to prove my practical knowledge; and theory without practice is but learned ignorance. Such are most of our book-makers' works upon rural affairs: they write so as to read better than practical men can; their works are gilded with ingenious erudition, painted with pithy and shining sententious remarks, that seduce the reader, by false ideas, that dazzle and mislead the judgment, and Ignis Fatuus like, betray their followers: yet much may be learned by reading the writings of ingenious authors.

The context of this work is not a spurious production, but the genuine, plain, simple narrative of real practice, unsophisticated: no attempts to interrupt, but to assist nature in colonizing and rearing trees. Nor do I profess to be nature's interpreter, so far am I from pretending to be one of the illuminati. If my generous readers consider my ideas to be common sense, common placed, my utmost wishes are realized.

It has been said that philosophy or the right way of thinking, in all arts and sciences is necessary. No art can be carried on successfully without reason, and practical knowledge of the rules belonging to that art. Speculative men seldom write well, viz. their theory is not sound, and practical men in general affect to despise theory; besides they are too much occupied in their vocation to think of writing; hence the difficulty of meeting with a good treatise, clear and distinct, without being loaded with matter foreign to the subject.

1 *Marshall on Landed Property*, is an excellent work.

2 *Edward Lawrence's Duty and Office of Steward, with Tables of Timber Measure.*

3 *Euvidale Price on the Picturesque.*

4 *Moses Cook, on Planting.*

5 *Ellis, on Timber*, is a flippent little work.

6 *Emmeric, on Forests*, do.

7 *Stephen Hale's Vegetable Staticks.* He was no superficial philosopher; he always numbered, calculated, weighed, or measured: yet some of his premises and conclusions are erroneous; still they help to raise new ideas, which expand and discipline the mind of the reader, who should never read any author with implicit faith, but think for himself.

8 *Dr. Nehemiah Grew's Anatomy of Plants, with Plates, exquisitely executed.* This work proves him to have been a profound Geometrician, (he drew the first Geographical Map of England.) Ladies who are fond of botanical drawing, would find much here to exercise their talents, either with the needle or pencil.

9 The immortal *John Hill, M. D.*, has discovered by his *Microscopical Observations on the construction and growth of Timber, with Plates*, a sixth member in trees. It lies between the wood and the pith, which he calls the *Corona*, or circle of propagation; thus enumerated:—1st Rind, 2nd Bark, 3rd Sap or Blea, 4th Heart or Wood, 5th Corona, 6th Pith. The Corona is the soul of the tree, and may be traced from the vegetation of the seed, into the plant, and is always conspicuous to the Lath Renders, as they never can cleave it; it always tears, particularly in Oak, Ash, Spanish Chesnut, and Pines. I have the Corona by me now, which was extricated out of a deal board one and a half inches thick; by being used as a stage for a wheelbarrow, the board was worn on both

sides until the Corona fell out; it is two and three quarter inches thick, that is circumference, and is marked all round something like a turnip. When the rind is torn off, it appears like net-work, the knots of which are the seats of propagation, or eyes that furnish the Parenchyma with Germens or Buds, that occasionally break out through the bark. It is from these knots that cutlings emit their roots. At page 203, is a Plate which shews the origin and construction of lateral shoots, which if attended to, will shew the pruner where to dis-branch, so as to make the least possible wound, and that is one principle art in pruning. *(See Hill's Work.)*

10. I would recommend *Maw's Gardener's Calendar*, his first, second, or third editions, to this list of rural classics, for its judicious instructions in the nursery.

It was by studying the nature and properties of the Corona and Parenchyma, that I first formed an idea of the non-circulation of sap in trees. It is the spungy substance of the Parenchyma that is the stomach and lungs in trees. Plain sense and a little attention will prove this assertion authoritative and genuine. Yet I doubt not that my denying a circulation of sap, and exploding the old barbarous system of *Runing* and *Springwoods*, I shall draw upon me the censure of as many opponents, as a Christian Pagan would have done in the tenth century, by writing against Mac Scanlan's Tomb, or Stonehenge, when kings and bishops asked the vulgar if they believed that Genii inhabited the barrows, woods, and groves? *(See Edward Sedgewick's Irish Antiquities.)*

Now my kind readers, as I am an avowed Rural Rustic, you must not expect elegant language, nor fine turned periods; it is the matter and not the manner, which I ground my hopes upon for your approbation.

RECAPITULATION.

10 Years serving Apprenticeship and Novitiate.
11 Years Landscape Gardener.
10 Years Stewardship.
9 Years Surveying and Collecting Notes in every County in the Kingdom of England, Monmouthshire excepted.

And now Moses like, after forty years wandering, I have retired to write my deuteronomy, or recital, not upon Mount Sinai, but to the Mountains in the West of Yorkshire, to enjoy the reward of temperance and industry, and I am proud to subscribe myself

Your most obedient,

And Humble Servant,

J. M.

MEMBER OF JOHN BULL'S SOCIETY, MASTER OF NO ARTS.

MR. EVELYN

TO THE READER, ABRIDGED.

THIS species of rural amusement, is reputed a consideration of too sordid and vulgar a nature, and beneath gentlemen to busy themselves withal, and who oftner find out occasions to fell and destroy their woods and plantations, rather than either to repair or improve them. But we are not without hopes of taking off these prejudices, and of reconciling to a subject and an industry, which has been consecrated, as I may say, by as good and as able persons as any the world has produced, and whose names we find mingled amongst kings and philosophers, grave senators, and patriots of their country; for such of old were Solomon, Cyrus, and Numa, Stolo, Cato, Cincinnatus, the Pisos, the Fabii, Cicero, the Plinys, &c., that disdained not to cultivate these rural rusticities, even with their own hands.

When Ulysses, after a ten years' absence, was returned from Troy, and coming home, found his father planting trees; he asked, "why, being now so old, he fatigued himself by planting what he was not likely to enjoy the fruits of?" the good old Laertes, taking him for a strang[illegible] [illegible]ly replied, "I plant, says he, against my son Ulysses comes home." The application is obvious and instructive to both old and young.

We now address ourselves to our own country gentlemen; praying of them that have woods, to carefully preserve and repair them. All persons who are owners of land may contribute by planting with infinite delight as well as profit.

My next advice is, that they do not easily commit themselves to the dictates of their ignorant hinds and servants, who are, generally speaking, more fit to learn than to instruct; and it is far more easy to make than to find a good husbander of timber; it requires a deeper search than they are capable of. We are then to exact labour, not conduct and reason, from the greatest part of them. The business of planting is an art or science, (for so Varro has solemnly defined it) and there is nothing more becoming and worthy of a gentleman. No science whatever contains a vaster compass of knowledge, infinitely more useful and beneficial to mankind, than the fruitless and empty notions of the greatest part of speculatists, counted to be the only erudite and learned men.

"These are the spells that to kind sleep invite,
And nothing does within resistance make,
Which yet we moderately take.
Who would not choose to be awake,
While he's encompass'd round with such delight
To th' ear, the nose, the touch, the taste, and sight?
When Venus wou'd her dear Ascanius keep
A pris'ner in the downy bands of sleep,
She od'rous herbs and flowers beneath him spread,
As the most soft and sweetest bed;
Not her own lap would more have charm'd his head.
Who, that has reason, and his smell,
Would not 'mong roses and jasmin dwell,
Rather than all his spirits choke,
With exhalations of dirt and smoke,
And all th' uncleanness which does drown

In pestilential clouds a pop'lous town?
The earth itself breathes better perfumes here,
Than all the female men or women there,
    Not without cause about them bear.
Let cities boast that they provide
For life the ornaments of pride,
But 'tis the country and the field,
That furnish it with staff and shield."

"Methinks I see great Dioclesian walk
In the Salonian Gardens' noble shade,
Which by his own imperial hands were made.
I see him smile, methinks, as he does talk
With the ambassadors, who come in vain
    T' entice him to a throne again.
If I, my friends, said he, should to you shew
All the delights which in these gardens grow,
'Tis likelier much, that you should with me stay,
Than 'tis that you should carry me away.
And trust me not, my friends, if every day
    I walk not here with more delight,
Than ever after the most happy fight,
In triumph to the capital I rode
To thank the Gods, and to be thought myself almost a God."

Cowley.

ERRATA,

Page 9th. seventh line, *moors*, read *mores*.
Do. fourteenth line, *moors*, read *mores*.

INTRODUCTION.

SINCE there is nothing which seems more fatally to threaten a weakening, if not a dissolution, of the strength of this famous and flourishing nation, than the sensible and notorious decay of her wooden walls, when either through time, negligence, or other accidents, the present Navy shall be worn out and impaired, it has been a very worthy and seasonable advertisement in the honourable the principle Officers and Commissioners, what they have suggested to this illustrious society, (Royal Society,) for the timely prevention and redress of intolerable defect. For it has not been the late increase of shipping alone, the multiplication of glass-works, iron-furnaces, and the like, from whence this impolitic diminution of our timber has proceeded; but from the disproportionate spreading of tillage, caused by that prodigious havoc made by such as lately professing themselves against root and branch, (either to be reimbursed their holy purchases, sold by Oliver Cromwell, or for some other sordid respect,) were tempted not only to fell and cut down, but utterly extirpate, demolish, and raze, as it were, all those goodly woods and forests, which our more prudent ancestors left standing for the ornament and service of their country. And this devastation is now become epidemical, that, unless some favourable expedient offer itself, and a way be seriously and speedily resolved upon for a future store, one of the most glorious and considerable bulwarks of this nation, will, within a short time, be totally wanting to it.

To attain now a spontaneous supply of these decayed materials, (which is the vulgar and natural way,) would cost, besides the enclosure, some entire ages repose of the plough, though bread, indeed, require our first care, therefore the most expeditious and obvious method would, doubtless, be sowing or planting. In the first place it will be requisite to agree upon the species, as what trees are likely to be of greatest use, and the fittest to be cultivated, and then to consider of the manner, how it may be best effected. Truly, the waste and destruction of woods have been so universal, that I conceive nothing less than an universal plantation of all sorts of trees will supply, and well encounter, the defect; and therefore, I shall here adventure to speak something in general of them all, though I chiefly insist upon the propagation of such only as seem to be the most wanting and serviceable to the end proposed.

He then proceeds to enumerate some species, with their mode of propagation spontaneously: or sowing, planting, grafting, super-grafting Cions, Sprouts, Shoots, Root, Cuttings, Layers, and inoculating of Aborigines, Aliens, and Exotics, as read to the Society, on the 15th of October, 1662.

It may seem strange that I should choose for my patron and pattern, an author who wrote his book just a century before I was born. My reason is, that I have not met with any author that has written so well upon the subject, or followed nature so rationally.

DENDROLOGIA.

CHAP. I.

TREATS of EARTHS, which I wave, because the eligibility of site for planting is arbitrary; therefore the variety of trees to be planted must be adapted to the soil and situation. The nursery should be fixed upon by the quality of the earth, if possible, a hazel nut-brown loam free from clay; yet sufficiently tenacious to hang on the roots, when the young trees are taken up.

SEEDS; as Acorns, Beech Mast, Chesnuts, Ash, and Sycamore Keys, &c, must be gathered in October and November, under the trees from which they have fallen; and be pitted in the ground until February, or March, then sown in the Seminary. The best and cheapest way to get Larch and all the family of Firs, is to buy two-year old Seedlings, in the trade, viz. from Nurserymen. He quotes DR. WOODWARD'S opinion, that water is the only vehicle, that carries with it a certain superfine, terrestrial matter, which gives body and substance, and all other requisites to the growth and perfection of plants.

He recommends cutting of glades through large woods, to ventilate them, in order to destroy noxious vapours, by which means he has known unhealthy situations rendered healthy.

But to return to DR. WOODWARD'S water and terrestrial matter applicable to every species of plants. It does not operate to the full extent and perfection of what it gives and contributes of necessary and constituent matter, unless the soil and temperature of the climate co-operate, which otherwise retards both the growth and substance of what the earth produces; sensibly altering their qualities,—if some friendly and genial heat be wanting to exert the prolific virtue.

Thus we find that the hot and warmer regions produce the tallest and goodliest trees; they are giants, far exceeding those of the same species, born in the cold north, which are but pumilas or dwarfs. Lastly, I would add that other cheerful vehicle, viz. light, which causes evaporation.

CHAP. II.

Of the Seminary.

A SMALL portion of the Garden will be sufficient to supply the Nursery with plants, for sending forth yearly colonies into all the naked parts of an estate, for timber, shelter, fuel, and ornament, to an incredible advantage, and much pleasure in the execution; and great profit ultimately.

To sow for Woods: six bushels of Acorns per acre will be a foot apart, and sow therewith Whin or Furze Seed. Pruning and Thinning must be particularly attended to. Also to guard against cattle and high winds, and not to plant too near buildings, as to endanger them, should the trees be ultimately blown down. He also cautions against digging up too soon Seed-beds of the Pine tribe, and Cedars of Lebanon, that sometimes do not come before the third year after sowing. He might have added the Ash, Haw, and Holly to his list. If six bushels of Acorns will give one Acorn to every square foot in an acre, there must be 7260 Acorns in each bushel. Acorns and Nuts for Coppices might be procured from France or Spain in seasons, when they cannot be had at home. Be careful they are not kiln-dried. Thinning and Pruning have no business in this chapter, except trees to be trained to twelve or fifteen feet for Dot-planting in parks, and Hedge-rows, to be out of the reach of cattle.

For small plantations of a few acres on small estates, the best way is to buy the plants from Nursery-men: but for large estates, there should be a Nursery of from one to five acres; the plants from the Seminary to be planted in lines a foot apart, and after standing two years, to be transplanted into lines at two feet apart, and one foot in the line, and there remain until the Spruce Firs are two feet high, all the rest will be larger; they will be good stiff plants, well rooted, whose leading shoots will be out of the reach of hares, nor can grass or weeds injure such a plantation. There should be lines of various species planted for the express purpose of budding and grafting upon, as Weeping Ash, Intire Leaved, Manna Ash, &c., Purple Beech, Lucomb Oaks, Variegated Sycamores, Chesnuts, &c., &c. There should be a waggon road to the centre of the Nursery for conveniency of drawing out the trees, and drawing in manure, if wanted, with room to turn round and come out.

CHAP. III.

OAK.

Quercus. Thirty varieties, mostly Exotics, viz. Quercus Rubra, or Silvestris. 2nd Quercus Urbana. 3rd Quercus Ilex. 4th Quercus Suber, &c. &c.

THE distance to be planted according to variety, from twenty-five to sixty feet: he allows that forty years may be gained in the growth of timber by judicious pruning and tillage:—Hedge-row planting is recommended. He prefers upland grown Oak to that grown in vales for ship building, and quotes Pliny, (in opposition to Lord Bacon,) who says, "Oaks grown in valleys are far more stately, tall, and spreading than those grown on mountains; but the timber of the latter is far better and finer grained, consequently more durable." He allows a century difference in time of coming to maturity:—He recommends grafting the narrow leaved English Elm upon Witch Hazel:—He recommends trenching the ground previously to planting, and cautions against deep planting:—He dwells much upon being careful to plant all trees to the same aspect, as they stood before removal, to which I say *Fudge.* I always look at the shape of my plant, and make it to face the west, with its back or round bend to the east He recommends never to fell timber in the flow of sap, but in November, (there is a statute for peeling Oak, from the first of April, to the last of June,) and to let timber stand all summer. Copsing he allows to be done from every eleven to sixteen years:—He says French Oak bears no comparison with ours for strength, the cause is obvious; which I think has been sufficiently elucidated in the first chapter. He now converts the Oak into Shingles, Poles, Laths, Cooper's ware, Clapboards for wainscot, rooted out, he says, by the finer grained Spanish and Norway. But how can Spain produce finer grained in so warm a climate? Do they make Clapboards of their Cork Trees, or some other Oaks? He now hits upon knees for ships, and the roots or buts for Cabinet work; and I think more knee-timber might be got out of buts than the heads of trees, much tougher and stronger than the limbs of heads.

In July, 1823, there was an inquiry made by the Port Telegraph of Hampshire, what could be the cause of the *Royal William* out-wearing all other ships of her date?

She was built in 1719, broke up in 1813, in the 94th year of her age, when her floor timbers and first futtocks were as sound as ever. She was built at Portsmouth, and it is said "that nothing is wanting to make other ships as long-lived, but winter-falling and three or four years' seasoning of the timber in the dock-yard;" and that charing, liming, brining, steaming, boiling, and snail-creeping are totally out of the question. What they call "snail-creeping" is gouging out in crooked channels the surface of the timbers and planks, to let in air to a free circulation.

The same paper of the 17th of January, 1814, says, "The *Montague* was built in 1779, of winter-felled timber, and was at that moment bearing an Admiral's Flag on a foreign station."

These hints put in practice would do away with the dry-rot. It is my humble opinion, that the most probable cause of the durability of these ships, was their being built with well-ripened timber, from a calcarious soil, perhaps Sussex chalk. It is also my opinion, that Oak is never ripe until there be some visible, external sign, which is generally in that of a dead top. However, there is not much dead-topped Oak to be seen now; but our dock-yards are supplied with Oak that is not ripe.

The same newspaper furnishes us with another proof of the scarcity of ship timber, not only for knees, but for other purposes; viz. MR. SEPING'S plan of diagonally framing ships, adapted with a view to the consumption of a greater quantity of shorter timbers, than of those that are convertible in the common way.

I have read of methods or schemes for training trees on purpose for knee-timber. By the time that is realized, some happy genius may point out a mode of growing square trees! This would save much in carriage, in hewing, sawing, &c. As long as the Royal Forests remain open, and are a common public pasturage, there will be a scarcity of knee-timber, because every acorn that vegetates in glades and othopen places, is eaten up by the cattle. What timber grows in forests, has sprung up among thorns; consequently the trees could form no heads, until they had got above their nurses, i. e. the thorns, which have nursed and pruned the Oaks to their own height. The said thorns are forest-tree pruners; but MR. PONTEY gives cattle the credit of pruning. Short-stemmed trees have always the largest heads, and the largest heads produce most crooked timber. It is the nature of Oak to form its head into lateral branches at three or four feet high, when it stands singly by itself. Let us suppose now, one part of a forest of fifty or a hundred acres fenced in, without any roads intersecting it, all the bushes cut down and carried off, and left fifteen or twenty years: I know by experience, that there will be plenty of fine Seedling Oaks all over the plains and glades:—at this time, copse them by thinning, and shut them up ten years more, and then admit the cattle, and let another thinning be repeated. The fence should be five feet ditch and bank, bearded with the bushes that have been cleared off; then plant Thorn-hedges. Thus the plains and glades will have enough of single trees for knee-timber, and the thickets for plank-logs, &c. However, to expedite with more certainty the cropping for cover, I would have acorns dibbled in, about three feet apart. They may be put in, any of the winter months; and you must be careful not to put them in too deep; if they are out of the sight of pheasants, they are deep enough. Had MR. EVELYN been properly attended to, there would now have been an abundance of well-ripened timber, fit for every necessary scantling in a ship, as he wrote his SILVA in 1662, viz. 162 years since.

LORD BACON'S opinion with respect to the quality of Oak, was in favour of that of free or quick growth, such as grows in Vales, Forest of Dean, and Wilds of Sussex. MR. EVELYN'S opinion was in favour of Oak grown on upland open ground

The following anecdote corroborates MR. EVELYN'S opinion. "A ship owner bespoke a vessel of a ship builder on the Sussex Coast. In two or three years, the vessel became so crazy, as not to be sea-worthy. The owner threatened the builder with an action at law; but they agreed to an arbitration, and the sides-men agreed that no fault attached to the builder. The true cause was in the timber, a great proportion of it being of Stanstead Oak, which was too good or hard for the other part that was of quicker growth."

MARSHALL estimates that to build a Seventy-four Gun-Ship, requires three thousand load, and allowing for waste, there must be nearly two hundred trees, of one hundred feet each; and above forty such trees on an acre would clear fifty such acres.

CHAP. IV.

ULMUS, the Elm. Eleven varieties, five of them Indigenous.

ELMS, he says, are of four or five varieties; viz. Mountain Elm; it has small leaves. Second French Elm, which has broad, smooth leaves. It will grow in marshy land to an hundred feet high. Both sorts are raised by Suckers and Cuttings, in March, when the Sap begins to rise. He recommends them for Avenues and Clumps, at ten or twelve feet distance; also for Hedge-rows. The third sort he calls Witch Hazel. He is under the necessity of going into Spain for Vistas and Elm Walks. This very work of his has caused some hundreds to rise in England. He doubts whether they are Indigenous or not, as he never had seen any north of Stamford. He supposes they came from Lombardy. He recommends Close Pruning in preference to leaving Stumps a foot long. Cattl are particularly fond of the green leaves and young shoots. The time of felling is November. He says he has grafted Elms.

It is very common to graft the Narrow-leaved English Elm, upon the Broad-leaved English Elm, in Yorkshire. I believe there is no other advantage in Grafting, besides that of propagating the variety, in preference to keeping Stools. For Laying in the south, they are all raised by Suckers, and this is what MR. EVELYN calls the Mountain Elm. It is the Elm that composes all the grand Elm Groves and Avenues in this Kingdom.

Ulmus Sativa, or Narrow-leaved English Elm. It may be known by its Bark, the young shoots being like comman Mapple, of a Cork-like appearance.

His French Elm is the *Ulmus Hollandica*, or Dutch Elm; and is the very worst sort we have. It will outgrow all the other sorts; it is very coarse, and apt to be colty. I measured one that was blown down at Warwick Priory, one hundred and eleven feet long, and twenty-three feet in circumference, at four feet from root. The Witch Elm in SIR WALTER BAGGOT'S Park, Staffordshire, fallen in 1674, The weight of the Top, Lop, and Shank, is ninety-seven tons. *(See Moses Cook's Preface to his Treatise on Forest Trees, with an Experiment on Pruning, Printed* 1724.*)* It must have been Dutch Elm.

MR. EVELYN'S Witch Hazel is the *Ulmus Campestris Glabra*, of Herts and Essex. It makes a beautiful tree, the shoots of which hang pendent, as the Weeping Willow. There are some at MR. PLUMER'S, Blakes-ware, at Long-Haddom, Herts; at Kelveden, in Essex; and from Horndon, in Essex, to White Elm Parish, in Suffolk, for the space of nearly sixty miles, the fences are chiefly formed of this Small-leaved Elm; and I am inclinable to think, that they are natives of this district; hence their name, Witch, alias Wych Elm, from White Elm Parish.

Ulmus Scabra, or Yorkshire Elm, is the Broad-leaved English Elm. It produces plenty of Seed, that hang something like Hops. It is a free grower, and makes vigorous but straggling shoots; therefore not so fit for ornamental planting, as for woods and groves.

Grand Avenues of the Narrow-leaved English Elms may be seen in most of the southern Counties, as in Windsor Great Park; at Gramby; Lord Grimston's, near St. Albans; and at Knowle, near Seven Oaks, Kent. At Strathfieldsay, in Hampshire, Duke of Wellington's, there is an Avenue a mile long, and sixty feet wide; the branches of the trees meet; they stand forty feet asunder, in lines; the stems of which measure at four feet high, from ten to fourteen feet in circumference. At Stanstead, Sussex, there is an Avenue which was planted in Quincunx order, in the year 1690. The trees are forty-five feet apart, every way. I felled three of them, in 1810, and sold them, as under.

	£.	*s.*	*d.*
455 *feet, at* 3*s.* 6*d. per foot*	79	12	6
254 *yards of Bark*	6	7	6
3½ *Cord of Wood*	3	13	6
150 *Bavins*..	1	2	6
Total,	£90	16	0

These Elms were twelve feet in circumference. Elm Bark half price of Oak Bark.

Just by is an Elm Grove from eighty to ninety feet high, in rows twelve feet asunder, and twenty-one feet apart in each row. The circumference of the trees in the interior part of the Grove, is eight feet, and the outside trees twelve feet; one is fourteen feet, and all girt at four feet from the ground; so they will average ten feet in circumference, or one hundred and twenty cubic feet, and fifty-seven trees per acre, or six thousand eight hundred and forty feet of round timber per acre. These trees were one hundred and twenty years old, and just ripe. Five of these Elms were cut at same time, viz.

	£.	s.	d.
255 *feet, at 4s. per foot*	51	0	0
2 *Load and 27 yards of Bark,*	4	18	0
Total	£55	18	0

Here is Sixpence per foot difference in value between Grove-grown and single trees, or Avenue trees.

In order that any Englishman may make himself acquainted with this Elm, I shall enumerate some places, where I have measured them from ten to sixteen feet in circumference, always taken at four feet above ground; at Hyde-Park, and Sweakly, Middlesex; Windsor Little Park: Hampton Court; Reygate, and Roehampton, Surry; Moore Park, Hertfordshire; Moore Place, Haddom, Herts; Bullstrode Park, in Bucks; at Wilton-House, Salisbury Close, and Longleat, Wilts; Sherburn, Dorset; Exeter Castle Hill, and Lord Fortescue's, North Devon; Mount Edgecomb, Cornwall; Warwick Park; Blenheim Park, Oxfordshire; Fawsley, North Hants; at Guist, and Mr. Fuller's, near Stratton; St. Michael, in Norfolk; at Nostall Hall, near Pontefract, Yorkshire; and at Chatsworth, in Derbyshire.

Narrow-leaved English Elms abhor clays, and all moist soils. I saw a line of them at Beauley Abbey, in Hampshire, fifty or sixty feet high, not more than four or five feet in circumference; all hollow from the root to the top, as if they had been bored for water pipes. They grew on a sandy, marly, wet, heathy soil.

CHAP. V.

FAGUS, or Beech Tree.

THERE are two sorts, the Black and the White. The White is best, and grows to a most stately tree. It makes the best of fuel, and is good for little else. (Quære.) It is so very subject to the worm, that, except, when it is always under water, it bears pruning well. It soon heals, and is not subject to sprout out in the stem.

I know of no botanical distinctions between the White and the Black Beech, nor do I think the Black any variety, but casual, as I never met with five trees of the Black Beech on any estate. They are raised by seeds only, and delight in dry land, particularly the Chiltern Chalk Hills. One bushel of Seed weighs 34lbs, if upheaped, and contains 58656 Seeds.

MR. PONTEY has given an engraved plate of a very handsome Beech, as a frontispiece to his Forest Pruner. But his detailed account is not only incorrect, but mischievous in its tendency. If MR. PONTEY were to live for a century or two longer, retain his improved faculties, and have a sufficient number of trees to practise upon, and spend his whole time amongst them, and they should be no more than fifty feet apart, I say, then he could not produce one like it; nor were it ever pruned, it would be impossible to raise such a Beech by art, any other way than in concert with others in thick groves, the shoots being too delicate to be kept as a leader to single trees. MR. PONTEY may find thousands in Sussex, as clean as his Woburn Beech, and much larger.

LORD SCARBOROUGH, from the year 1680 to 1690, had an Avenue cut through Stanstead Forest, in Sussex; and within the Park, on each side of the entrance of the Avenue, there were about ten acres planted with Beech, which is now a Grove from eighty to ninety feet high, with clean stems from thirty to sixty feet, and from eight to fourteen feet in circumference, at four feet above ground.

The Woburn Beech is eleven feet in circumference, at four feet high, and seventy-five high to the top shoots. Now take half of eleven feet, as a mean will be sixty-six inches, one-fourth of which is sixteen and a quarter; then by the slide-rule, $75 \times 16\frac{1}{4}$ gives 138 feet, to which add 28 feet, that is $\frac{1}{5}$ of 138, gives 166 feet of round timber.

I know by experience, that this is a good mode of ascertaining the contents of standing trees, let the height and head be what they may; and the fifth to be added is for the swell below the girting place, and the parabolic form above, that all trees naturally grow to.

I cut a Beech Tree down in the said Park, the stem of which was only four feet high, and branched into three limbs, the contents of them was

	£.	s.	d.
457½ *feet, sold at 2s per foot*	45	15	0
3½ *Cord of Wood*	3	13	6
150 *Faggots*	1	11	6
Total,	£51	0	0

This proves, I think, that branches and leaves are not robbers, but caterers. Nor is there a single headed clear stemmed tree in England, of any kind, that has so much timber in it at one measurement, without limbs or head.

Now, as to my opinion, that the Woburn Beech never was trained by art,—On Stanstead Estate, is a Beech-Wood, called *Buster Hanger*, now sixty years old, that never was pruned, and is now eighty feet high, viz. fifty feet naked, and thirty feet tops. In the lower side of the Wood, are five trees as straight as the one in question, which I cleared and marked. Now, should Mr. Way attend to them, and keep them clear, by occasionally ordering encroachers to be removed, people might say, in his Grandson's days, that his Grandfather paid much attention in having them cleared, even to twenty yards round each; but it would be presumption, and a risk of their veracity, to say, that he pruned them, as the old Woodwards there, told me, "that they had never heard of pruning until I introduced it."

There are Beeches in Stanstead Park (as high as) twenty-one feet in circumference.

In Moore Park, twelve feet, with heads one hundred and eighty feet diameter. In Ashridge Park, as good as at Stanstead, in Hertfordshire. In Knowle Park, Kent, twenty-three feet in circumference, one hundred and ten feet high, and one hundred and ten feet diameter. This is what I call natural growth, feathered down as low as the teeth of cattle will admit. They look well in Avenues and single trees, in Parks, or in Lawns; the Woburn Beech pleases and looks grand, when seen, because it cannot be seen at a distance, being surrounded by other trees. Suppose such a tree to stand on a Lawn, in a Park, how would it harmonize with the picturesque scenery about it! Set an artist to paint such a tree in the centre of the ground, from the point of view he has chosen for his landscape, and all the time he has it before him, there will be some floating ideas of a Water-Spout at Sea, or an immense long stemmed Mushroom. It is properly a Grove tree of the first rate, and there let it bide until its head be blown off, which is likely enough in ten or fifteen years, as the Wood-Peckers have bored it, at about thirty feet high; and they never bore a sound tree.

There is a purple or copper-coloured variety.

CHAP. VI.

CARPINUS OSTRYS, or Hornbeam.

IT is fit for little but fuel and Hedge-Screens:—MR. EVELYN. It is handsome with Thorns and Maple, in Forest scenery, variegated with Holly. It is very hard wood, and I believe it to be the Forester's Black Beech. It may be had at most Nurseries. There is a very pretty variety, the leaves of which are scalloped on the edges. It is called Hop Hornbeam, from its Seeds hanging in teguments, something like Hops. It is a Shrubbery and Lawn Plant.

CHAP. VII.

FRAXINUS, or Ash.

THE Keys may be sown with Corn. As they lie one year in the ground, they will come up the spring after the Corn is harvested, and all that are intended for the Nursery, should be drawn out at two years old, to get rid of the Tap-root; it is a bad neighbour to Corn-fields, by reason of its numerous and far-spreading roots. It is excellent fuel, green or dry.

I had one Ash tree cut at Stanstead, which measured as under:

FRAXINUS EXCELSIOR.....	*Stem*...............	$9 \times 35\frac{1}{4}$	$=78$
	Main Limb....	16×22	$=53$
	1 *Length of do.*	$6 \times 15\frac{1}{2}$	$=10$
	Other Limbs....	$18 \times 12\frac{1}{2}$	$=19\frac{1}{2}$
	Rest...............	48×10	$=33$
		Total Feet	$193\frac{1}{2}$

Sold $193\frac{1}{2}$ *Feet, at* 3*s. per Foot,* £29 10 6

This is another proof against MR. PONTEY'S idea, that single stemmed trees will increase the general weight of timber sooner than forked trees. *(See his Work, page 152.)*

MOSES COOKE, on Forest Trees, gives us the dimensions of one grown at Cashioberry, with a clean stem fifty-eight feet, and six feet circumference in the middle, (by Slide-rule 130 feet,) without any of head.

We allow the Oak to be the king of the Forest; the Ancient Greeks, I believe, allowed the Ash that honour. Their mountains abound with Marble and other Limestone, consequently the soil is of a strong, dry, calcarious mixture, which Ash delights in. Their Sceptres and Spears were of Ash.

> "Thus fell proud Ilion's bulwarks, tow'rs, and spires,
> Then Troy, though rais'd by Neptune, sunk in fires,
> So when an aged Ash, whose honours rise
> From some steep mountain, tow'ring to the skies,
> With many an Axe, the shouting swains is plied;
> Fierce they repeat the strokes from ev'ry side:
> The tall tree trembling, as the strokes go round,
> Bows the high head, and nods at ev'ry wound.
> At last quite vanquish'd, with a dreadful peal,
> In one loud groan, rolls crashing down the vale
> Headlong with half the shatter'd mountain, dies,
> Stretch'd out its huge length, th' unmeasur'd ruin lies."
>
> *(See Virgil and Homer's Poems.)*

MR. LEY, in his Land-Steward, says, "That no land is more proper for Ash, than swampy, boggy soils, that cannot be drained so as to grow grass, or corn." I know such places are good for growing Ash Poles, to be cut from twelve to twenty years old; but after that, they soon get full of morbid knots.

There are Ashes of the first rate in Blemheim Park, Oxfordshire; Hagley Park, Worcestershire, one hundred feet high; at Fawsley, North Hants, fourteen feet circumference, and from eighty to one hundred feet high; in More

Park, Herts, twelve feet circumference, and one hundred feet high; at Guist, Norfolk, of the first rate; Bishop Aukland Park, in the County of Durham, first rate; at Chatsworth, Derbyshire, first rate; at Sir William Strickland's, near Bridlington, Yorkshire. It is not generally known, I believe, that between Scarbro' and York are forty miles of Chalk-Land, like unto the Southern Counties, only the Chalk is harder. At Fonthill, Wilts, is a noble Avenue of Ashes, one of which measured eleven and a half feet in circumference; at Longleat, Wilts, are many of from nine to twelve feet circumference, and fifty feet stem; in Woburn Park, is a line of Ashes seventy-five feet apart, their heads meet, and I measured some from ten to thirteen feet circumference.

"*Plant, plant, plant, my friends, plant, but not in bogs.*"

CHAP. VIII.

FAGUS CASTANEA, or Spanish Chesnut.

THE Plants do not like to be removed, on account of the tap-roots. He has not done justice to this Plant, for it is preferable to Oak, either in buildings, or fences, and particularly for Park Pales. It is raised by Seed, and is as patient of being transplanted, as the Oak, when properly managed in the Nursery, by not being allowed to stand more than two summers in one place.

Mr. Marshall's Rural Economy of Southern Counties, two Volumes, printed 1798, says, "That Spanish Chesnut is allowed to be the best of Underwood, or Hop-poles, if planted one thousand one hundred per acre, and produce five thousand Poles, worth £70, at ten years' growth." The Kentish men are excellent managers of Coppice-Woods, never allowing any vacancies to remain in them, without filling up with young Plants; and some are so nice as to dig and clean their Coppices.

The Author of American Husbandry, two Vols. 1775, says, "That it grows in swamps, from nine to twelve feet circumference, and sixty feet clean stem." I used to mix them in planting for Mr. Brown, of Frampton, Dorset, and found they always took the lead of most other Plants; nor is there any deciduous Forest trees so prone to run up with a leading shoot, the Larch excepted.

MR. PONTEY should have chosen this instead of Beech, for training.

LIEUT. COL. EMMERIC, Deputy Surveyor General of the Royal Forests, Chases, and Parks, published a small Octavo Volume, in 1785, wherein, he says, "That the Spanish Chesnut Tree is not a Forest Tree." At Mount Edgecomb is one, whose clean stem is thirty feet high, and twelve feet circumference, which proves it is not a Shrub. In the Bishop of Durham's Park, I measured to ten and eleven feet circumference. In Beechworth Park, near Dorking, Surry, are many; one of them eighteen feet circumference, and ninety feet high. In Lord Egremont's Park, Petworth, Sussex, there is one sixteen feet in circumference. In Cowdery Park, is an Avenue of them, monsters, twenty to thirty feet in circumference, all Pollards. When I was there, the poor people from Midhurst, were carrying away the Nuts by sacks-full, in 1815. In Cashioberry Park, going up on the left of the Grand Junction-Canal, is an extensive grove of the first-rate trees:—Also at Studley Royal, near Ripon. There are some by the Road side at Rusforth-Hall, between Bingley and Keighley, Yorkshire; twelve feet circumference, and sixty feet high, with a clean stem, twenty-five feet diameter of head thirty feet.

Æsculus Hippocastanum, or Common Horse Chesnut. It is one of our first-rate trees for ornament in Parks, and for Shade in Cattle-Pastures. It is of quick growth·

the wood is white, but of little value, except for Turners and Carvers. I was offered four shillings per foot, for a tree, in Buckinghamshire, by a Carver, for Picture Frames. He said it was mild to work, and never warped. This tree will grow to as large a size as any variety we have.

CHAP. IX.

JUGLANS REGIA, or Common Walnut Tree. Five Varieties.

IT is very tenacious of being removed, on account of its tap-root. A Walnut planted the same instant a tree of ten years' growth is transplanted, DR. HUNTER, says, "That the Seedling will overtake the Transplanted tree." But he does not say how soon. They delight in a dry loam. For Avenues and Hedge-rows, they should be planted forty feet distance from tree to tree. The thin-shelled Double Nut is best for eating, but the small hard Nut tree is best for timber. I planted ten Walnut trees on the east side of Stanstead Gardens, in 1812, and in the second year after, they made shoots from three to six feet long. I have my doubts if ever Seedlings do so much. The timber is generally used by Chair and Cabinet Makers. It sells about the same price as Oak; but during the last war, the demand was so great, that it got up to six shillings per foot, for Gun-stocks, which tempted people to make sad destruction amongst the trees all over the Kingdom. B. WAY, ESQ. had one so large, that he told me he had been offered one hundred pounds for it.

For further information, I refer the curious to WILLIAM ELLIS' Work on Timber Trees, Printed 1742.

EMMERIC'S Work, Printed 1789, admits this as a Forest tree.

COOK, on Timber, Printed 1724, recommends Budding. I suppose, he means the Double-shelled Nut should be Budded upon stocks of the Small Hard-shelled Walnut tree.

Some people prefer the Pulp of the Ripe Nut for Catsup, to that of the Green Nut. It is less trouble, and there is no loss of fruit:—thus extracted. When the Nuts are got out of Outer Coat or Pulp, put the Pulp together two or three days, then put them into a sack or bag, and press them over a pail, or bucket, or bowl. One bushel will produce four or five gallons of liquor, which is to be boiled and spiced as is usually done for other Catsup.

CHAP. X.

SORBUS AUCUPARIA, or Mountain Ash, or Wiggin.

IT is classed with the Wild Cherry. (This Chapter leads to nothing. But as I profess to follow my pattern, and add something to each chapter, by way of an Appendix, it was necessary that I did not drop this link.) It is handsome in Shrubberries, and in Hedges, and we have no better Copse Wood. There is one like it in wood, but different in leaf; that is the *Sorbus Hybrida.* There is a beautiful variety of Sorb, which grows in Lord Sheffield's Woods, and an old Plant, like an Apple-tree, with Maple, or Liquid-amber leaves, stands near the water in Sheffield-Place Park, Sussex. There is another in Hawkswood-Hedge, belonging to Benjamin Way, of Denham, Bucks, Esq.

I was at Arundel Castle, in 1806, where the Gardener shewed me a Pear tree by the side of the Entrance Road in Castle Garth, with three Grafts put in at about eight feet high, that had shot up three feet. That summer, he said, the people used to get the Pears. And in hopes of getting leave to grub it up, he told the Duke, that it was no Service. The Duke replied, "I'll make it a Service." I smiled, and told him, that his master was Pruning, when he gave the order for Grafting, as the Mountain Ash is a species of Service. I have one at Oldfield, growing in my Paddock, twenty-five feet high, heads diameter twenty feet stems, for it has two, which are ten feet each, and each forty-two inches in circumference; or measured together, sixty-seven inches.

The Wild Cherry Tree is principally used by Chairmakers; it grows to a stately tree, and I consider it in Plantations, as a Nurse; in Woods, as a Weed; in Coppices, it may be like the Birch and Hornbeam, viz. better than a bare place.

CHAP. XI.

ACER CAMPESTRE, or Common English Maple.

IT is raised from Seeds, and valued (for its timber is curiously dappled, or marbled,) both by Turners, and Cabinet-makers. He might have added by Musical Instrument makers. It is a good Coppice-wood, and admirable, mixed with Thorns, where gentlemen introduce Wilderness-like, Forest Scenery.

There are ten other varieties, as Striped, Scarlet, Sugar, Ash-leaved, Striped Bark, Italian, Montpelier, Cretan, and Cut-leaved. Are there any more of them?

CHAP. XII.

ACER MAJOR, or Sycamore.

THIS Chapter is not worth transcribing. It is known in the Northern Counties by the name of Plane Tree, and is worth in these Manufacturing Counties, as much as Oak. When large enough for Calico Printing Blocks, it is worth six shillings per foot, on account of its hard stiff shoots. When young in spring, weathering all winds, either sea-breezes, or breezes on mountains, renders it the most valuable tree we have to plant in such exposed situations. Also for Screens on the west side of other Plantations.

There are some first-rate trees in Knowle-Park, belonging to the Duke of Dorset; and at Lord Northesk's, at Harrow on the Hill, Middlesex, there is a Grove of them, one hundred feet high, straight and clean stems, from sixty to seventy feet high. They abhor a wet situation. I have one that became my property by destroying an old crooked fence, and making a straight one, giving and taking land with my neighbour, in exchange. In levelling the ground, more water has flowed to its roots than usual, and it sickened. Not a root of it has been disturbed; no earth added, or taken from it. It was so weak last spring, that only part of its buds produced leaves; and I expect it will die this winter. It was at the time of the exchange, three years ago, a vigorous Plant, whose stem was nineteen inches in circumference.

Since writing the above, there has been an Eruption of *Crow-Hill Bog*, and the Tan or Ooze therefrom killed many Sycamores, from forty to fifty feet high, in the vale, at Ponden, merely by drenching the ground a few days. The water that killed mine, was of a cankery nature, as if from bog, or coal.

There is one in the close of Rochester Cathedral, that was, in 1817, ten feet in circumference, at four feet high.

In order to save troublesome repetitions, and at the same time, that it may be understood what I mean by rates, see the following table, viz.

1st. Rate,	9 *to* 16	*feet in circumference*	*of*	*Stem.*
2nd. Rate,	6 *to* 9	*do.*	*do.*	*do.*
3rd. Rate,	3 *to* 6	*do.*	*do.*	*do.*

All trees under three feet in circumference are termed Carpenter's Ware; and all trees measuring more than sixteen feet, are Monsters.

N. B. Always measure at four feet above ground, or nearest small place to that.

CHAP. XIII.

TILIA, LINDEN, or Lime Tree.

ITS timber is not subject to the worm. It may be propagated by Cuttings, Layers, and Seeds. It bears pruning well, and should be planted in walks, from eighteen to twenty-five feet apart, in lines. It is good fuel. How far it is good fuel, when dry, I am ignorant; but I know it is hardly possible to burn it green, i. e. when fresh cut.

There are six varieties, viz., Common; Red Twigged; Small-leaved; Broad-leaved; Hoary-leaved; and White Lime Tree.

It is very singular, that a kind of tongue comes with the leaf that is fixed on the Midrib, on the back of the leaves, which produces the bloom. All the Genus of Ferns produce their bloom on back of the leaves, as do the *Ruscus Aculeatus*, Prickle Box, or Butcher's Broom. It bears a single red berry in the autumn. Mr. Farey's Derbyshire Survey gives a list of fine Avenues of Lime Trees, and informs us, that the Earl of Chesterfield's Library is fitted up with the Lime Wood that grew in the Park. He says, it is very handsome. In Blenheim Park, are first-rate Lime Trees. In the close of Rochester Cathedral, is one, which I measured in 1817, it was then nine feet in circumference. At Chatsworth, Derbyshire; at Longleat, Wiltshire, in a grove, one hundred feet high, of a clear stem, sixty feet, and ten feet circumference. In Cashioberry, Park is an Avenue; and at Ashridge Park, they are seventy feet high, and twelve feet in circumference; and in More Park, are Lime Trees, with six feet stems, and twenty feet circumference, with heads one hundred feet diameter. In Lord Carlile's Park, are two Avenues, one hundred feet high, intersecting each other at right angles, and dividing the Park into four, in the centre is an obelisk, one hundred feet high, and one of these Avenues crosses a swamp, in which the Limes do not thrive. Now, had there been a good drain laid the width of the Avenue, i. e. across, and a few pounds laid out in raising the ground, prior to planting, the Park Scenery would have been infinitely handsomer. At Rushforth Hall, by the road side, between Bingley and Keighley, is a Lime Tree, seventy feet high, and fourteen in circumference. In a meadow at the same place, is another, whose head is seventy feet high and wide, stem seven feet, and it is twenty-two feet and a half in circumference. N. B. This is the smallest part of seven feet stem.

CHAP. XIV.

POPULUS, or Poplar

IT is propagated by Suckers, Cuttings, and Truncheons, ten feet long, and let two feet into the ground. The Italian Black Poplar bears pollarding; the White will not: but the Laterals may be pruned off, though some say, No.

The *Abele* and Asp have a place here, and require the same culture. Abele was brought from Holland; all of which make good boards for dry situations. Canadian Black Poplar does well in the Cheshire Marls and Strong Loams. There are twelve varieties, viz.

1*st*. The Common White Poplar. It is more like the Black than any of the other Poplars, yet it is easily distinguished from it, by its silvery bark in winter, and lighter-coloured softer leaves, in summer. They grow to a large size, but should never be allowed to exceed six or seven feet in circumference, if profit is your object; for at that size, they are at their consistence, and after this, all the interior begins to be *Porous*, (which in Oak and Spanish Chesnut Trees, would be called Heart.) Thus it is with all the White Woods.

2*nd*. The Black Poplar of Italy. It seems it was known by EVELYN, and I believe it is the best of all the twelve, the Arbele excepted; yet strange to relate, I never met with one old Tree. The largest I know of, are at Ford-Hill Castle, near the Chiviot Hills, in Northumberland, and on the bank of the River, at Keighley. The leaves are dark and glossy, and the young shoots very dark.

3*rd*. The Trembling Poplar, or Aspen Tree. It is known by its small, round, shining, scalloped leaves, which are always tremulous. It is more subject to throw up Suckers from the roots than any other Poplar; and the leaves of such Suckers are very like to the Arbele the first year, after they assume their natural form.

4th. The *Arbeel Populus Var. Nivea*, or Great White Arbeel Tree. No other tree that I am acquainted with grows so fast as this; its White-wood is more valuable than any other. It has a large dark green leaf, the underside resembles cotton, and is as white as silver; and so are the shoots, the first year. At Strathfieldsay, Chalfont-House, Bucks; and at Kingston, Surry, are first-rate trees. At Longleat, are some, one hundred feet high, from ten to twelve feet in circumference, with forty to sixty feet clean bole. At Knowle, I saw one, nine feet circumference, that had been felled and cross-cut. What a Carpenter would call the Sap, was about four inches thick, good, and in a state of consistence; and what he would term Heart, was spungy, and more like the inside of an overgrown turnip, than any thing else I can compare it with. In Lord Fitzwilliam's Park, at Wentworth House, I saw another of these overgrowths, down, and sawn a-cross; it was just the same as the Kentish one. This is the case with all the White-woods, when suffered to stand too long. (Hence the carpenter's idea of the Sap of old Ash, being better than the Heart.) In marshes and on banks of rivers, it will get to a state of consistence in forty or fifty years;. but on champaign, dry situations it will require from fifty to seventy years maturing, and when seasonably felled, is good for any kind of building purposes, on farms, particularly for doors and floors; and in the large folding doors for barns, it is light and never warps.* These four sorts are indegenous, and the rest are exotics, more curious than useful.

**Abele* derived its Etymology as follows :—First, *Abel-shittim*, Genesis 50c. 11v. Numbers 33c. 49v. 2nd Samuel 20c. 14v. Hence *Abele*, alias *Shittim-wood.*—Second, *Chittim*, see Numbers 24c. 24v. Jeremiah 2c. 10v. Ezekiel 27c. 6v. Hence *Chittim-wood.*—Third, 5*th*. Lombardy Poplar, well known in all towns and villas.

6*th*. Balsam Poplar, or Common Tacamahac.

7*th*. Heart Leaved do.

8*th*. Smooth Leaved. I dont know the 9*th*.

Caralina Poplar is a very white tree, whose young shoots are fluted, by having three or four ribs on them, consequently the old bark upon the trunks is very turgid and rough. It will not grow so tall as the Lombardy, but makes the fullest spreading head of all I know; and makes much litter in spring by falling of its flowers. At Mr. Baker's, near Hertford, is one, eighty feet high, and ten feet in circumference. There is another near Keighley, on the Colne road. The Canadian, Athenian, and Various-leaved, to me are Nondescripts. MR. EVELYN has classed the Tulip Tree with the Poplars, which are of the twenty-second class, and order *Octandria*. The *Liriodendron Tulipifera*, belongs the thirteenth class, and order *Polyginia*. Don's Catalogue says, it is an exotic, brought from North America, in 1688. Its bloom is a perfect Tulip, its leaf, a perfect Saddle in miniature, its

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Exodus 25c. 10v. *Shittim-wood*. Numbers 25c. 1v. Joshua 2c. 1v. Daniel 11c. 30v. Joel 3c. 18v. Micah 6c. 5v.—Fourth, *Kittim*, Genesis 10c. 4v. 1st Chronicles 1c. 7v.

Now these places were east of Jordon, on whose banks and in the plains, these Poplars grew. These plains joined the plains of Babylon; and these plains of Babylon joined the plains of Nineveh, south of which was built the City of *Arbela*. Hence the *Arbeel* Poplar grew on the plains of Nineveh, and the banks of the Tigris and Euphrates. And as most of our Poplars derive their names from the place or country from whence they are introduced into England, the most appropriate name for this, would be the Asyrian Poplar.

Moses was no novice, as no other tree could afford him such ample boards and staves, clear of knots, light and tough, and not subject to warp or worm. The American Poplars grow under same latitudes as those of the east.

wood is well known to Cabinet-makers; it deserves a place in our Shrubberries and Woods. There is one at Lord Ilchester's, Melbury, Dorset, whose trunk is seven or eight feet in circumference.

CHAP. XV.

Quick Beam, Witchen Tree, Wild Sorb, or Black Ash.

IT is literally the Mountain Ash, alias Wiggin. *(See tenth chapter.)*

CHAP. XVI.

CORYLUS AVELLANA, or Common Hazel.

IT is a Coppice-wood, propagated by Seeds and Suckers,and used for fences, faggots, herdles, corves for coal-mines, hoops, &c. The Nuts are good to eat when blanched with warm water, as Walnuts and Almonds are. There are six other varieties, viz. White-Filbert, Red-Filbert, Cob-Nut, Clustered-Nut, American-Nut, and Turkey Hazel: all equally hard and fit for Coppices.

CHAP. XVII.

BETULA, or Birch.

IT is indigene of England, propagated by Suckers, and used as a Coppice-wood, and by Turners. It thrives in all situations, sandy or boggy. He treats of its being tapped for its Sap, to make Birch Beer, and Wine:—Of the circulation of Sap, discovered by pruning:—That Sap rises in the wood, and not in the bark:—That the increase of wood is by the descent of Sap:—And that the bodies of Plants, as well as animals, are nourished by a double pabulum or food; as water and air, both impregnated, mixing and coalescing by mutual conversion. (error.)

There are hints in this truly philosophical Chapter, that might be dilated to a Volume.

Of this amphibious Plant, there are nine varieties, viz. the Common, Weeping, Poplar-leaved, Black, Paper, Soft, Tall, Smooth, and Hairy Birch. The wood of which is used generally for pot and glass- crates, and the spray or young shoots, for brooms, alias beesoms. It is but of moderate growth: the finest I ever saw, is at Watergate, the seat of George White Thomas, Esq. It is forty or fifty feet high, and well proportioned.

CHAP. XVIII.

ALNUS, or Alder.

IT will grow in continual water and bogs, and is propagated by Seeds and Truncheons. It will lie long under water, but soon rots above ground. It is used for gunpowder, the bark for dyers, the poles for rafters, shoeheels, and turnery-ware.

Betula Alnus. There are eight varieties, viz. the Common Alder, Cut-leaved, Notched-leaved, Glaucous-leaved, Elm-leaved, Curled-leaved, Oblong-leaved, Turkey, and Oval-leaved Turkey Alder.

Dorsetshire Woodwards have the same adage applied to Alder Poles peeled for rafters, as those of Midland Counties have for Willows and Poplars, viz.

"Thatch me well and keep me dry,
"And heart of Oak I will defy."

This is truly an Aquatick, that will thrive when constantly in water, (Poplars, Willows, and Oziers will not,) yet it enjoys a medium best. The finest Alder Tree I ever saw, is in the Bishop of Durham's Park, its trunk measured, in 1818, eleven feet in circumference; it grew upon a swell, in a swamp; and the finest Poles I ever saw, grow in the bed of a brook, that is always dry in summer; they were from sixty to seventy feet high in 1815, growing in Arnold's Vale, below Sheffield Place, Sussex. Stakes of Alder will not stand twelve months; nor will the timber do for Posts, or any thing else to be in contact with the ground; except under water: nor will any of the White Woods. But they ought not to be rejected in toto, as they are useful for many other purposes, either in-doors or out; particularly linings for stone-carts, and wheel-barrows, that are in constant use: as being soft, they bruise, but do not split by stones being tumbled in. I had a door made of Alder, for my Orchard, five years since; also a light wicket-gate to a Field, and they are as sound as ever: they make better weather boards, than Elm or Beech, because they do not warp or cast.

CHAP. XIX.

SALIX, Ozier, Sallow or Withy, and Willow.

THEY are all propagated by Cuttings. The Ozier for Basket-makers. The Withy for thatching rods, fork, rake, and sythe handles. It affects dry as well as moist situations. Its *Julus*, or Palms, vulgarly Goslins, are very conspicuous in spring. Its leaves are like Plum-Tree leaves; they are good to fill up vacancies in Copses, by putting in Truncheons. It makes the best of cutting boards for Shoe-makers, and to clean knives upon; as the

Willow, when free from knots, Yorkshire Saugh.

Oziers do not love watery bogs, but dry banks of rivers and aites, (little islands in rivers.) They are raised by Cuttings and Seeds, contained in their Juli, or Catkins. An acre worth to rent from ten to twenty pounds a year.

Salix, or Willow. White and Black delight on the banks of rivers, provided they do not wet their toes. Shoots of three or four years' growth are to be cut to ten feet long, and let into the ground two feet deep, with a Crow-bar, on a bank, and their heads are out of harm's way by cattle. Willow Tree boards, in 1700, were laid for floors. *(See Ellis' Work on White-Woods.)*

Salix Capria, or Common Black Sallow, is the Yorkshire Saugh, and South Counties' Grey Withy. There are many varieties, by reason of its propagating itself by Seeds, blowing about like Thistle-down; it has a leaf similar to Plum-Tree leaves, and of various colours, being always of the same colour as the young shoots, whether green, black, or grey. It grows readily by Cuttings taken of two or three year-old shoots. *(See Withy above.)*

It is the best Under-wood for Coppices, that we have. It makes good fences; and sheep herdles made of it, will always last a year or two longer than those made of Hazel; and no soil or situation comes wrong to them, wet or dry.

Salix Amygdalina, Almon, or Peach-leaved, is the most common, and generally known by the appellation of Huntingdonshire Willow; for which there has been a great demand for making Willow Hats, for Gentlemen's summer wear, split and worked the same as Straw for Bonnets. It grows to a large size. There is one by the Lodge of Milton House, Northamptonshire, seventy feet high, head sixty feet diameter, and stem thirteen feet circumference. There is a Holt of this Willow, seventy feet high, in Cheshire, between the River Weaver and Manchester Canal.

Salix Alba, or White Willow. Mr. Farey's Derbyshire Report, says, "Phillip Gell, Esq., of Gate-House, in Wirksworth, felled one of these, nine feet in circumference; of which, he sold one hundred and fifty-six feet, at two shillings and six-pence per foot, amounting to nineteen pounds ten shillings."

Salix Lanata, or Downy-leaved, might very properly be called *Salix Argentia*, or Silvery. It is of quicker growth than any other, and by far the handsomest; its Silvery foliage renders it very conspicuous, when agitated by wind. It is common in Southern Counties: there is a large tree of it by the Mill, at Peterborough.—*Salix Protea.*

Salix Babylonica, or Weeping Willow. It is handsome, and there are twenty-two other varieties, which I think my readers will excuse me for omitting their names here.

Salix Viminalis, or Ozier, of which there may be as many varieties, as there are of the Withy and Willow.

The sixteenth Volume of the Report of the Bath Agricultural Society, page 129, says, "Oziers for baskets should be very tough, and bleach well; they are sold by the ell-hoop, which is three feet and nine inches in circumference of iron, tightly compressed in; and eighty bundles, bolts, or hoops, make a load, worth from twelve to twenty pounds." The best land will produce a load per acre, of one year's shoots; but half a load is not a bad crop, on bad land. The expense of weeding, renewing, cutting, and bleaching, i. e. peeling, is about five pounds per acre, when the business is well done.

The Red and the White Welch Willows are so bitter, that neither cattle nor rats will bite them; they are of a bad colour when peeled. Autumn is the best season for planting, as the Cuttings will have got roots by christmas.

The twenty-third Volume of the Transactions of the Society, for the encouragement of Arts, Manufactures, and Commerce, 1805, says, "Seth Bull, of Ely, planted seven acres of fen land, in 1803; it was cast into beds, twelve feet wide, and raised eighteen inches. In spring, 1804, he planted fourteen thousand per acre, of what is called French New-kind." Captain Bull, planted, in 1801.

	£.	s.	d.
Cost per acre, for beds,	12	0	0
14000 Sets, at one pound per 1000,	14	0	0
Planting, at three shillings per 1000,	2	2	0
Weeding twice,	0	16	0
Total Expense,	£28	18	0

	£.	s.	d.
Annual Expense, Rent,	0	10	0
Weeding,	0	16	0
Parish Rates and Fences,	0	10	0
Cutting the Rods, at three shillings per score bundles of 45 inches Girt,	1	4	0
Interest of Planting Expense,	1	9	0
Annual filling up Casualties,	0	6	0
Total Expense,	£4	15	0

	£.	s.	d.
Annual Value. 160 Bundles of Rods, at 1*s.* 4*d.*	10	13	0
Total Expense,	4	15	0
Net Profit,	£5	18	0

If Peeled, the expense will be four pounds more, and then it pays very well, as the work is principally done by women and children.

The nineteenth Volume of the above Work, says, "Thomas Sellby, of Otford Castle, Kent, planted twenty-one acres; twenty thousand Sets per acre, in rows, two feet apart, and one foot in the row, for which he paid, by contract, for Sets and setting, five pounds per acre; some of which is bog, sandy loam, and a reddish clay, subsoil stiff clay." The dryest parts succeeded best; and he says, "All wet land, that is worth farming, is worth draining."

In the twentieth Volume of the same Work, is an account of Mr. Shirreef's seven and a half acre Salictum; first, well drained, and brought to a good tilth; sown with turnips, and as soon as they were taken off in December, the land was again ploughed, and planted with Withies, five years old, at two shillings per thousand, for planting, only at eighteen inches intervals, that is, nineteen thousand three hundred and sixty Sets per acre; allowing six inches out of sixteen inch-lengths, to stand above the ground; that the young shoots may be out of the reach of grubs and slugs. It was hacked, hoed, and hand-weeded, during summer, which cost nine pounds. His old Salictum brings him in eighteen pounds ten shillings per acre, net. He sold twelve acres and a half, statute measure, of one year's shoots, for two hundred and twenty pounds. Willows, for making up deficiences, should be cut three feet long, that their tops may have air. *(Captain Head, near Haddington, Scotland.)*

In the twenty-second Volume of the same Work. J. Arthur Borron, Esq., of Warrington, Lancashire, had thirty-four acres, trenched sixteen inches deep, and laid into beds, seven feet and a half wide; and he planted in spring, eighteen thousand Sets per acre, statute measure, This is irrigated as water meadow, in dry seasons.

The twenty-fourth Volume of ditto, gives a Suffolk Salictum of Mr. Wade's.

	£.	s.	d.
Ploughing, Harrowing, and Planting Sets, per acre, ...	2	2	0
12000 Sets per acre, all butt-ends of shoots, ...	10	0	0
	£12	2	0
Fifteen acres and a half, statute, cost ...	£187	11	0

In a quantity of land, a man will do well to make a net profit of ten pounds per acre; for the plants are very subject to the depredations of insects. A brown bug attacks them, and then a black caterpillar, which renders them crooked and short, so as to reduce them from eight to two feet.

Willow Beds, in Hams, by the river side, at Frampton, Dorsetshire, is worth, for herdling, at three years old, twenty-two pounds per acre, statute measure. Their best Hazel Coppices, at eight years old, is only worth ten guineas. Striping, or peeling, alias bleaching of Willows, is performed by women and children, having a beam fixed, or on legs at a convenient height, with holes bored with an inch auger; into which is put a stick, and its upper end is cleft, through which cleft, the Willows are drawn, and that draws off the bark. It is very similar to drawing wheat straw, for what is called thatching reed.

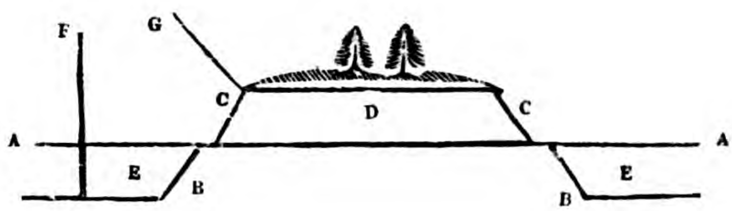
CHAP. XX.

Quick-set Fences.

OUR Plantations finished, and Forests adorned with a just variety; but it is all in vain, without good fences.

> "Plant fences, the plantations round about,
> And while yet young, be sure keep cattle out;
> Severest winters, scorching sun infest,
> And sheep, goats, bullocks, all young plants molest.—
> Bane of all our hopeful timber."

Hawthorn, *Oxyacantha Vulgaris* makes the best hedges. The berries should be pitted one year before sown; then taken up and sown in February; and when three or four years old, plant the best of them in two lines, a foot apart, and two plants to a foot in each line; then make dead hedges to protect them. He gives us a long detailed account of the great billing hedge making, in Northamptonshire. It is unnecessary to get into their deep five feet double ditches; also, avoid his other plan of bank, without ditch: they are both very good, but not well elucidated. He recommends Crab-tree, Oak, Pyracantha, Elder, and Furze for hedges; and allows a load of Copse-wood to make thirty pole of hedge, upon the bank, or ten on level ground. Four-pence a rod for bank and ditch of three feet; plants and planting, four-pence; and two-pence for hedging on bank, or four-pence on ground.



A. A. represents the surface of the ground. B. B. the width of the bank at bottom, six feet, and four and a half at C. C. One good clod set on edge, forms the face of the bank, on each side; the middle is filled up at D. with turf and earth from E. E. which is called a floor-ditch; and C. C. is called a foot-bank. There is a clod put along the foot or set-clod neatly, with the turf downwards; and the middle is filled, a little rounding, to allow for settling. There are two rows of Plants, twenty-five in each per rod.

This was done when farm labourers worked for nine shillings per week. I gave twelve shillings for each waggon-load of Coppice-wood; and twelve shillings for a waggon, three horses, a man, and a boy, for carriage six miles.

Where I had only sheep to fence against, then the hedge was on bank, as C. G. And a load of wryce-wryth or hedge-wood, would make eighteen or nineteen rods of fence.

When there were other cattle to fence against, then the hedge was as E. F. Expense as follows:—

	£.	s.	d.
Banking per rod, ...	0	0	9
50 Thorn Plants, per rod, ...	0	0	9
Planting Thorns,........	0	0	1
Hedge-wood, ...	0	1	3
Hedging, ...	0	0	2
Total, when Hedge on one side only,.........£	0	3	0
Ditto, when Hedge on both sides, ... £	0	4	5

When the hedge was made on level ground, as at E. F., it took a load of wryth to do twelve or thirteen rods, statute measure.

	£.	s.	d.
Banking, ...	0	0	9
Plants, ...	0	0	9
Planting, ...	0	0	1
Wood, ...	0	1	10
Hedging, ...	0	0	3
Total, when Hedge on one side only, ... £	0	3	8
Ditto, when Hedge on both sides, ...£	0	5	9

N. B. Hedge on the bank, two feet high; and off the bank, three feet and a half high.

When proper attention is paid after this, another dead hedge will rear the live fence, viz., keep the Plants clean, and shroud up the sides, not with shears, but a staff-hook, as per figure.

A

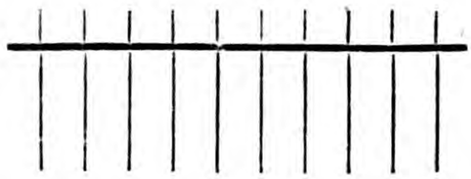
The crooked blade A. to be made strong, with a socket, into which, a handle, four or five feet long, is to be put. The crookedness of the blade prevents its turning in the hand: and with this, beginning at the bottom of the hedge, and cutting upwards, one man will do more work, and with less exertion, than six men with shears, and better for the hedge. It naturally becomes wider at bottom, with a ridge at top, like a horse's mane, called a hog-mane; here are but two sides to cut. In the old way, there are two sides; with a flat top, worse than both sides. It resists winds better, and never gets naked at the bottom, as the clipped hedge always does; and so do the cut-plashed or laid-hedges. Whenever this hog-maned hedge becomes too thick, then shrowd up one side close to the stems; and in a year or two after, shrowd up the other side.

This kind of foot-bank and floor-ditch, guarded as above, I have done some miles in length, on each side of a new turnpike road, which I made, in the parishes of Frampton, Stratton, and Bradford, in Dorsetshire. But for the interior of Mr. Brown's estate, they use herdles for guard-fences, which are cheaper than stake and bound-dead hedges: they are pitched or set, staked and tied, for a penny per rod. N. B. The stakes pointing is included.

Many plant their thorns on level ground, the expense, if the ground be properly trenched, six feet wide, and eighteen inches deep, will be as much as the Dorset foot-bank. There are many miles such, on Stanstead estate, with only a single line of Plants, twenty-five in a rod; and better fences this country cannot produce.

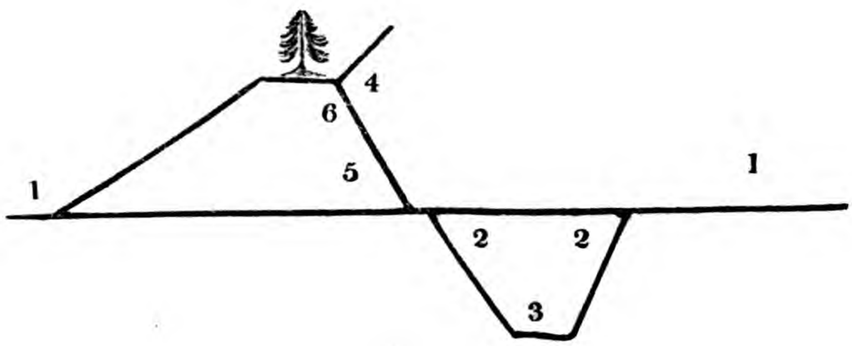
In dry summers, the roots are out of drought; and in hard winters, not affected by frost. In any thin or weak place, instead of thrusting in bushes, which always make a hole, I used to have a rail, bored, at six inches intervals, with an inch auger, and then sawn or cleft; then common hedge-stakes fitted to the auger-holes, and let into the ground, with a crow-bar, from three to any number required, as per figure.

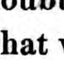
SCOTCH FENCE.



It is known there by the name of Scotch-fence. When the rail is driven on to the stakes, it prevents sheep creeping, at the same time, admits of lateral shoots, without interruption, and before it decays, it will be grown into the hedge.

In loamy, clayey, or swampy land, where ditches are absolutely necessary, to take of the drain, as well as the surface water, and to elevate the thorn roots above any stagnant water, set out your ditches to any width, at pleasure, but always to the shape of an *aquilateral triangle*, and then the rampering, or face of the bank, as well as the ditches, will slope to an angle of forty-five degrees.



Suppose 1. 1. to be the surface level. 2. 2. the width of the ditch, three feet; the bottom of the ditch at 3.; the face of the bank at 2. and 4.  is the new planted hedge. Now, should there be a doubt about the hedge thriving, on the top of the bank, in what was thrown out of the bottom of the ditch, throw all the turf into the interior of the bank,

and lay one row of plants at 5. with their tops cut off, and laid even with the face of the bank; then go on to 6. and lay in another row of Plants, and proceed to 4. beating the whole face of the bank with the back of the spade, until it is as hard and smooth as a mud-floor. It will then stand, and keep clean, until the thorns have got above the bank.

There seems to be a great difference between the quantity of hedge, made with a load of wryth, in Dorsetshire, and one of MR. EVELYN'S, Northamptonshire hedges: but to those who are intimate with both, it proves the accuracy of that valuable author. A load of Northants-wood, grown on their rich land, is coarse, and will not go above one third so far as a load of the Dorset-wood, grown amongst their chalk-hills, drawn fine. The hedges on these high banks are but fifteen inches high, at No. 4, and that little but stakes and binders; hence a load doing more than the Dorset.

This ditch and bank, at the above size, are just the same expense as a floor-ditch and foot-bank, in the work. The operator has just two and a half cube yards of earth to raise in a rod of five and a half yards.

I have built a wall, six feet high, in a deep lane, and levelled the ground to the top of the wall, and planted a line of thorns at the level of the wall top, close behind, which is thirteen chains long, and a Plant to every link. I shall trim up the east side annually, to thicken it for shelter, and as we are eleven hundred feet above sea level, I think the west wind will trim the west side.

CHAP. XXI.

MORUS ALBA, or White Mulberry Tree. 2nd, MORUS NIGRA, or Common Mulberry. 3rd, MORUS PAPYRIFERA. 4th, MORUS RUBRA, or Red Mulberry.

AS this is only fit for a Garden, Orchard, or Shrubberry, I cannot give it room here. Its fruit makes a pleasing variety, and a delicious table fruit, good wine, and a rich syrup.

CHAP. XXII.

PLATANUS ORIENTALIS, or Oriental Plane Tree,

THIS is the true Plane Tree. The West Indian Plane Tree is less jagged. The Romans first brought them out of the Levant. It loves marshy land, and is propagated by Layers and Cuttings. He gives a curious account of Xerxes, with his army of seventeen hundred thousand men, stopping to worship one; which proves he had learnt to appreciate the value of shade, in a hot climate; so had Jonah, when he lost his Gourd, he wanted to die, God said to him, "Dost thou well to be angry."

Lotus Arbor, or Treefoil and Cornelian, or Cornel, I reject.

Acacia delights in moist situations. He says, "It loves marshy land." So I say, and the whole genus class and order of Forest Trees love marshy land. But what is marshy land? it is not boggy,—it is not swampy,—No; but it is the richest and dryest land we have, with a substrata moist. I study to be brief as possible, yet wish to make myself understood; as this is a text that might be dilated, and run out to a great length.

I have raised scores of *Platanuses* by Cuttings. They are most assuredly the noblest, and most delicate, soft-coloured Forest Tree we have, to ornament our Parks with. It is a quick grower, and exceedingly crooked, yet it has a natural propensity to grow straight. I never saw a crooked tree of it, that was ten years old. There was an avenue of the *Platanus Orientalis*, whose boles were twelve feet in circumference, in 1802. They are since destroyed, by order of Lord Pembroke, to make room for some alterations, at Wilton-House. There was a frost in the morning of the 9th of June, 1809, that killed every Plant in the Southern Counties, young and old, however sheltered. The Derbyshire Report says, "There are some fine trees in Bradby-Park, that were planted in 1735. Go there, ye Nursery-men, for Cuttings. In 1818, I saw some first-rate ones, in a swampy part of Lord Tankervill's Park, at Chillingham, Northumberland. In Chiswick Park, Middlesex, is a *Platanus Occidentalis*, seventy feet high, head sixty-five feet diameter, and bole ten feet circumference. There are a number of fine trees in a marshy part of Ootland's Park, Surry.

The *Lotus Hirsutus*, and *Lotus Doryenium*, are only Shrubberry Plants.

The *Cornus Mascula*, or Cornelian Cherry, is but a Shrub of the Dog-wood class. There are also, the Great-Flowering, Blue-Berried, White-Berried, Red-Twigged, Green-Twigged, &c., all Dog-woods.

Acacia, or *Gleditsia Triacanthos*, or Three Thorned Acacia. This deserves a place in our Woods, but should be planted in the interior, and by themselves, to draw one another up; as they far out-grow the Oak, they are apt to break by winds; the timber is excellent, and very durable; it rives well into stakes, pales, and laths; the

Seedlings are cheap at the Nursery. There are, also, the Water and Strong-Spined Acacias.

CHAP. XXIII.

Of the Fir, Pine, Pinaster, Pitch-Tree, Larch, &c.

1st. *Abies, Picea, Pinus, Pinaster,* Larch and Spruce Fir, are all raised of Seeds; *Picea,* or Norway Spruce, and Silver Fir.

2*nd.* Hemlock-tree of New England, and Scotch Highlands, grows large.

3*rd.* Stone-Pine, with Almond-Seed, is the *Almug* and *Algum.* 1st. Kings, 10c. 11v.

4*th* *Pinaster,* or Wild Pine;—*Pinus Longifolia.* The leaves of mine are six inches and a quarter long.

5*th.* Spanish; by us called Scotch-Pine.

6*th.* Oakwoods, succeeded by Beech, Cherry, &c. page 122.

7*th.* Timber is not so good grown on a north, as on a south aspect.

8*th.* *Cypress,* page 129. Scotch Mountains, page 134.

9*th.* Timber up to six inches, square.

10*th.* *Pinaster Tœda,* or Pitch Tree, page 124.

11*th.* Oak Tree, dug up in draining, near Hatfield, in Hertfordshire, one hundred and twenty feet long, twelve feet butt, ten feet in the middle, and six feet at the small end; for which, twenty pounds were offered; and fifteen pounds for another, of one hundred feet in length.

12*th.* *Almugim Tree,* or Wild Pine.

13*th.* Balm of Gilead Fir, page 133.

14*th.* *Larix,* or Larch, 133rd page. Beams, of one hundred and twenty feet long, see page 134. MR. WM. PONTEY is a plagiary; for MR. EVELYN tells us, "That the Larch is a native of Stiria, Corinthia, and other Alpine Countries; that it is more indurable in any situation, than any other timber, and takes a good polish."

I shall now comment upon the above fourteen heads.

1*st*. *Abies Picea*, or Spruce-Fir. Norway-Spruce is the handsomest of all the Fir tribe, to stand as a single tree in spacious Shrubberries, where I have seen it fifty or sixty feet high, feathered to the turf, as a beautiful pyramid: its timber is of a good colour, and has a very mild even grain, fit for Carvers; it also makes the very neatest of Deal-doors. I cut one down in Buckinghamshire, belonging to B. Way, of Denham, Esq., that was fifty years old. It had lost its leader at fifty feet high, and had thrown up three, each of which was twelve feet.

	Cwt.
Trunk, 48 feet long, contained 77 feet, ...	55
99 fagots, stacked close, measured 26 cube yards, ...	38
Tops and Lateral Limbs, 60 cube feet, 84lbs. per foot, ...	45
Root grubbed, and produced $8\frac{1}{2}$ cube yards, stackwood,...	12
Total, ... Tons 7.	10.

2*nd*. Hemlock Spruce-Fir, is a beautiful, delicate Plant, deserving the most conspicuous place on a Shrubberry-lawn. I saw in the Shrubberry, at Bullstrode, Bucks, a Fir, which I supposed to be a Spruce-Fir, of a dark green colour, and about seven feet high; it seemed as if it did not make shoots more than two or three inches in a season, and grew thick and close, spreading out all round at the bottom, in a form of the train of a court Ladies' dress, and turning up, as if it had taken root with a numerous offspring, so beautiful, that for my own private amusement, I would rather have it than the Portland Vase, that is in the British Museum. I do not know its name, but I would call it *Pinus Pumila*. Bullstrode belonged to his Grace the Duke of Portland.

Pinus Picea, or Silver Fir; this is the most lordly, and quickest grower of all the Fir tribe. There are scores of them in an extensive Plantation, at Wardour Castle, Wilts, whose aspiring heads are far advanced above all the rest. This may not be allowed to be picturesque; however, if they will not group well on canvass, they have a noble and pleasing effect there. At Longleat, is a grove of sixteen trees, twenty-two feet apart, one hundred and ten feet high, and from ten to thirteen feet in circumference; two hundred feet per tree, and at the above distance of trees, are ninety trees per acre, or three hundred and sixty loads. I have never found any on elevated situations in the Northern Counties; there are three handsome trees by the road side, in Broughton Park, once the seat of Lord Strafford, now Vernon, Esq., three miles north of Northampton. At Farnley Dog-park, near Otley, Yorkshire, are some good Silver Firs. In 1807, I had one felled that had done growing; it was drawn to a saw-pit, and slabbed on two sides, then thrown on the flat-side, and sawn into three planks, each eight inches thick. I let them lie out of doors one year, raised one foot above the ground, with laths or strips of wood between each plank; and afterwards converted into beams, alias summer-trees, joists, and floor-boards, for a farm house, called Monks, at Stanstead, Sussex, in which, were four floors laid of this tree. The boards were laid temporary, as I expected they would shrink; but they never shrunk in the least, which I consider as a strong presumption, that to let timber grow ripe, or consistent, is the true mode of seasoning. I saw them ten years after, when they were as perfect as possible, and of an excellent colour, with a curling grain, consequently roughish to work. In 1813, I had three others cut, which were planted in 1686; they stood in a line, fifteen feet apart, and were from one hundred to one hundred and twelve feet high: each tree had lost its leader at forty feet high; and I am inclined to think, by a spring frost, such as destroyed the ***Platanuses***, in June, 1809. There is a first-rate tree at Denham-Court, that lost its leader perhaps in the same way. There is another at Knowle Park, Kent, fourteen feet in circumference, one hundred feet high, and the trunk forty feet: it had then three leading shoots. This is another corroboration of trees with large heads, having always the best fed stems. When the above three trees were felled, and off-cut, they measured at each end of the butts, boles, or trunks, as follows.

Quarter.		Circumference.			
1st.	Butt	36	Top	24	Inches.
2nd.	do.	32	do.	22	
3rd.	do.	25	do.	17	

Butt Girts. Top Girts of clean Stems.

					Feet.
First Tree.	36 feet long.		26	Girt, ...	170
1st. Top	54	×	11½	do.	50
2nd. do.	54	×	10½	do.	41
3rd. do.	54	×	10	do.	38
Total feet of round measure, ...					299

SECOND TREE.

				Contents.
Butt, bole, stem, or trunk, 35	feet long	¼ girt	25	152
1st. Top 48	×	....	12	48
2nd. do. 48	×	....	11	40
3rd. do. 40	×	....	8½........	20
4th. do. 40	×	....	7	13
Total, ...				273

THIRD TREE.

	Feet		Girt.	Feet.
Butt was in length, ...	40	×	20	112
1st. Top	40	×	9	24
2nd. do.	40	×	9	24
3rd. do.	14	×	7	4
			Total, ...	164

Total of three Trees; 736 feet, or 14 loads, and 36 feet. The tops and lateral branches, commonly called Lop, made 288 Bavins, and 2 cord 88 parts of Cordwood.

The Spruce Fir, as well as this, is reckoned amongst the White Deals; yet the lateral branches of both were so full of turpentine, as to be as red as brick, and four pounds per foot heavier than Oak. They burned like an old tar-barrel. I think such used as piles and stakes, must be very durable in any situation.

In the twentieth Volume of Arts, Manufactures, and Commerce, now before me, is an account of the Society granting their gold medal to Henry Vernon, Esq., of Hilton-Park, near Wolverhampton, for having planted upwards of six thousand Silver Firs, which he had from Scotland, in 1797.

3*rd*. Fir, of MR. EVELYN, is *Pinus, Pinea, Cembra*, or Stone Pine Tree; whose Seeds are eatable as Almonds, and is called by the Americans, Almond Pine, and by the Ancients, *Almug*, and *Algum*,* Its leaves are longer and thicker than Scotch Fir, and its hard cones much larger; it is of a quicker growth, and the timber higher coloured and coarser.

*Exodus 35c. 7v. Ist. Kings 10c. 11v. 2nd. Chronicles 2c. 8v. 9c. 10v. 11v. Also, Ezekiel 27c. 6v.

4th. Pinus Pinaster, or Cluster-Pine. It has longer leaves than the Stone-Pine, and bears its cones in clusters; its timber is much as the other, on account of its heavy wiry leaves, and it is rarely met with of any size. It is getting into disgrace through deformity, for want of shelter.

5th. Spanish, alias Scotch-Pinus, *Sylvestris*, or Scotch-Fir. I cut eighteen of this, and Stone-Pine, in 1813, of from five to eight feet circumferences, and sold them altogether, at three shillings per foot. The prunings are good browse for deer.

6th. Oak-woods most injudiciously wove into this chapter, in which, he says, "An Oak-wood became a Beech-wood, and a Beech-wood into a Cherry-tree-wood." Woods, thus metamorphosed, are easily accounted for, as follows:—an old Oak-wood managed in the old barbarous system, of what is called a Spring-wood, or a Running-wood, in the south, is, to keep cutting the oldest, which always cripples many of the Saplings, until it becomes so bad, that it is necessary to cut down, clear out, and then wait for a new crop: for some years prior to this, perhaps not a single Acorn had grown in it, but Beeches had been suffered to occupy some open places, that they had shed and continued to shed their Seed, and being of a quicker growth than Oak, overpowered whatever was near it. I knew an Oak-wood, in Yorkshire, that became a Cherry-tree-wood, in the same way. I turned an old Beech-wood into an Oak-wood, in a similar manner: thus, at Water-gate-Hangers, at Stanstead, was an old Beech-wood, with a lot of old crooked trees, straggling all over, and Under-wood, at ten years old; I had all the old weeded clean out, and also all the over-growths of young, except a few thickets of Beech; and in five years after, I had part of it copsed, and as far as I had the superintendence, I reduced it to a beautiful young Wood: some few places were thin, which I submitted to, in preference to leaving any Beech.

7th. Timber not so good on a north, as on a south aspect. This shews, that very little escaped the attention of my indefatigable and very sagacious pattern. The ground, on a northern declivity, cannot receive the genial warmth of the sun, like unto plains that are flat, or have a southern inclination; therefore evaporation is weaker, also, the expansion of sap in the tree is weaker, consequently, spring and midsummer shoots are weaker, and their leaves less qualified as caterers to feed upon what little gassamer, or evaporation does rise, than their southern neighbours.

8th. Cupressus, or Cypress. Which ever MR. EVELYN means can only claim a place in the Shrubbery. There are seven varieties: the deciduous Cypress grows to the largest size of any that I am acquainted with; it is a delicate and beautiful tree: the ancients had no other name for many of their trees, but the name of the place they had them from, for their curious ornamental works; some from *Chethim*, alias *Chitem;* and from its abounding with Cypress, obtained the name of Island of Cypress, and all the places adjacent that Coast. Josephus says, "Hence *Kittim-wood.**

9th. Timber. None called so that would not square six inches; so it is to this day. Merchant's timber is all measured, that will square six inches; but for government dock-yards, only one limb, and the spire is admitted: all the other limbs are cut off. Dr. Rhees' Cyclopædia, says, "Timber trees are such as are three feet in circumference, at three feet above ground, tall and straight." Now, by way of distinction, I call all trees, (see 48th page.)

10th. Pineaster Tœda, or Pitch-Tree, or Frankincense-Pine.

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*Genesis 10c. 4v. 1st. Chronicles 1c. 7v. And *Chetim-wood*, Numbers 24c. 24v.

11*th*. Oak, such as never grew; the contents given can only be reconciled to truth, as follows:—the dimensions were taken in feet, and entering-notes, called yards; had Mr. Evelyn's Secretary, in order to make it read more scientific, reduced these mistaken yards into feet; then the dimensions would stand thus—trunk forty feet long, instead of yards; and four feet diameter at butt, instead of yards; two feet at top, instead of yards; and three and one-third in the middle, or ten feet in circumference are one hundred and twenty inches: one fourth, taken as a mean, will be thirty inches for the side of the square, which is always called the girt, in measuring round timber, gives just two hundred and fifty feet, for which, were offered twenty pounds, viz. four pounds per load.

Admitting of the original dimensions, then the mean diameter is ten feet, or one hundred and twenty inches; the side of a square equal to such a circle is one hundred and six inches, which is eighty feet cube, for every foot in length of tree; gives one hundred and ninety-two loads for twenty pounds, is two shillings and a penny per load: or take it at round timber measure, by Gunter's scale, and quarter-girth is ninety-four inches, gives sixty-two feet round measure, for every foot in length of tree, viz. one hundred and forty-eight loads, at two shillings and eightpence half-penny a load.

I have never yet met with a tree, that measured one hundred and twenty feet from the root to the summit: there is an account of a Deal-plank having been sent to a Roman Emperor, as a rarity, one hundred and twenty feet long, and two feet broad. This Oak is represented as three times that width, at the small or top end. The following I extracted from the History of Dorset:—"In Litchet-Park, in 1740, was dug up, an Oak, three feet under ground, fifty-three feet long, the side of the square four feet, (but it does not say all the length,) there were thirty-three feet more of the top, got out afterwards: so that the whole tree was eighty-six feet long." In Servants' Hall, Dudley Castle, Staffordshire, is a table all in one plank, fifty-one feet long, and three feet broad, from which were cut twenty-one feet and nine inches, before it could be got in at the window. The total length was seventy-two feet. Now, suppose its head to be twenty-eight feet high, gives one hundred feet; this is credible.

12*th*. *Almug*, or Wild-Pine, is described under No. 4.

13*th*. *Pinus Balsamia*, or Balm of Gilead Fir, is fit for Shrubberries only.

14*th*. *Pinus Larix*, or Common White Larch.

In a Beech-Grove, on Badby-Down, Fawsley, Northamptonshire, is a Larch-tree, that was planted in 1749; it was one hundred and five feet high, head sixty feet diameter, and bole eight feet circumference, in 1818.

A Fir-Larch, in Orange-Grove, at Stanstead, was forty years old, in 1814; it was then seventy-two feet high, and contained seventy-two feet of timber.

Weymouth-Pine aught to be classed with the Larch, and other Firs: it is true their leaves are in bunches like the Pines, but they have soft slated cones. The cones of Pines are hard and turgid, and raised in lozenges, not unlike the fruit of Pine-apple, and perhaps derived their name from Pine-apple. The wood of Weymouth-Pine is milder than any other Fir, and when plained smooth, has a glossy satin-like appearance. The Deal, or Pine has a coarse, harsh grain, sonorous, and easily cleft. All Firs are quite the reverse. Whoever saw a fiddle with a Fir-wood belly? or a bunch of Fir-wood matches? They are always Deal.

Weymouth-Pine and Scotch-Fir, the same age and same size.

Spruce-Fir, of the same age, only fifty feet high, and twenty-five feet of timber.

In Townley-Park, near Burnley, in Lancashire, are some first-rate trees; also at Durnham-Park, Lord Stamford's, in Cheshire. At Strathfieldsay, Hants, forty years' old, sixty to eighty feet high, and six to nine feet in circumference; they stand thirty feet apart, and are feathered to the ground. Others of the same age, twenty feet apart, naked stemmed.

Weymouth-Pines here, in competition with Silver-Fir, and Stone-Pines, one hundred feet high, and ten feet in circumference of boles. One Weymouth-Pine, only seventy feet high; the branches spread thirty-five feet, and cover down to the ground: the stem of this tree is eleven feet in circumference.

Mr. Farey, in his Derbyshire Report, says, "A Mr Shuttleworth has the doors, sashes, tables, chairs, and other furniture of a room, made of Larch-wood, of fifty-nine years' growth, whose contents were seventy-three feet:" he adds, "That one stood near Hopton-Hall, which was fifty-four years old, in 1809, and measured eighty-three feet and a half; and another at Sir J. Bankes', which was planted in 1755, and measured, at four feet above ground, in 1811, five feet and eleven inches." Larch timber sells from two shillings up to two shillings and nine-pence per foot, with the bark on.

These facts corroborate Mr. Pontey's judicious remarks, "That all sorts of Pines, that are commonly cultivated in the Island, would be good timber, provided they were properly trained, and grown to a competent age."

I had some cut, that grew to eighty feet high, in forty years, in an old Chalk-pit, Sussex: a Master-builder pronounced them to be the best yellow Deals, he had ever seen; they were all of the Scotch-Fir; but what was most extraordinary to me, several of the trees were real White Deal, and I think they are to be known when in the Nursery, by the colour of the young shoots, as they rise in spring and summer,

In the twenty-first Volume of the Society's Transactions of Arts, Manufactures, and Commerce, Adelphi, London.

Earl of Fife, says, in his Forest of Mar, Scotland, "There are Firs six feet diameter, and the quality of the timber was such as induced the directors of a bridge building, to fetch their timber above one hundred miles, by land, although but six miles from the Sea-port of Aberdeen."

This six feet diameter Pine must be nearly nineteen feet in circumference, as seven is to twenty-two, so is six feet diameter to eighteen feet and six tenths in circumference. I dare venture to say, the bole of the tree is not very high, and that it supports an enormous head, well spread out, that has enabled it to swell such a stem or bole: it must be many centuries old, and the grain very fine, as Forest of Mar is within two or three degrees of being as far north as Riga in Livonia, from whence our best and finest grained Deal comes, including Denmark, Sweden, and Russia. Now, if Forest of Mar is much higher above sea, than Riga, its timber will be better, viz. finer grained, consequently stronger. I have no doubt but our Yorkshire mountains, if planted *enmas*, would produce the best Oak and Deal in the world, being so far north, and so much elevated, taking quantity and quality together.

CHAP. XXIV.

PINUS CEDRUS, or Cedar of Lebanus.

IT is a native of Mount Lebanus, Barbadoes, Bermudas, New England, Bogs of America, and the Mountains of Asia. So it is happy hot or cold, wet or dry; it is not subject to the worm, except that of Barbadoes, and Jamaica, nor will moths come near it.

Thuga Arbor, Vitæ of Canada. It is much used by Turners, and by Government, for Pullies, and is called *Lignum Vitæ*, or Tree of Life,—*Arbor* a Tree, and *Vitæ* Life.

Mr. Maundrel says, "One of the sixteen Cedars on Mount Lebanon, was thirty-six feet and a half in circumference, bole fifteen feet to five limbs, that spreads one hundred and eleven feet diameter."

The Quarterly Review of 1817, No. 34, says, "Cedars on Mount Lebanon are twenty-seven feet in circumference." If this be the same as Mr. Manudrel measured, he was fond of the marvellous, so took all the irregularities of root at the surface of the ground; whilst the other took an honest girt at some, three, four, or five feet high. A Mr. Morecroft surveyed the Ganges, and saw on Himalaya Chain of Snowy Mountains, Cedars of twenty-two feet in circumference, at six feet high; here he is not sufficiently explicit, by omitting to inform us whether the trunk was only six feet high, or he took his dimensions at six feet high from the ground. Please to contrast this, and the following; and you will perceive the difference between a sloven and a man of business: thus, Mr. Farey, in his Derbyshire Report, says, "There is a Cedar, at Bradby-Hall, that was planted in 1682, whose trunk for seventeen feet high, measures thirteen feet and two inches, on whose top rise three prodigious upright branches, nearly all of a size, in 1811."

I was at Lord Pembroke's, Wilton-House, Wilts, in 1802; the Park might be aptly called the British Mount Lebanon, on account of its Cedars: I measured one, that was fifteen feet in circumference, and again, in 1816, it was sixteen feet in circumference, viz. one foot gained. At Harefield, is one, whose stem is fifteen feet high, and eleven inches and a half in circumference. At Chiswick, are some; one was, in 1818, thirteen feet and a half in circumference; total height seventy feet, head sixty-five feet diameter: both the last are in Middlesex. At Black-Park, in Bucks, near Slough, is one, whose top is 60 × 60, Stem twelve feet circumference; and at Barne, near Beaconsfield, are many, that were planted by Waller, the poet, that are now eighty feet high, and eight feet circumference. At Audley-House, near Saffron, Waldon; also at Thorndon, near Burntwood, Essex, there are some first-rate trees; and at Sir George Armitage's, of Kirklees, are three, close by the Hall.

Cypress, MR. EVELYN says, "Is the Gopher-wood of the ancients," which I doubt. I think Gopher was the name of a place, where timber grew, fit for building the Ark.* As Ophir-wood, from Ophir or Gold Country, or Land of Gold, a mountain where Solomon sent ships for gold, situate in 20° south latitude, and 53° east longitude, Josephus says, "It was Pine-timber, of which they made pillars for the Temple, psalteries, harps, cymbols, and other instruments of music.

Thuga Occidentalis, and *Orientalis*, *Arborvitæ*, are as the Cypress-trees, fit for the Shrubberries only, in this country. So of the Juniper.

CHAP. XXV.

1*st*. *Quercus Suber*, of Spain, the bark is four or five inches thick; the manner of decortication, is once in two or three years, taking the outer bark only; beneath the *Cortex*, or Cork, are two other coats, or *Libra*, of which, one is reddish, which they strip from the bole, when it is felled only; and this bears a good price with the Tanner.

2*nd*. *Ilex Major*, *Glandifera*, or Great Scarlet Oak.

3*rd*. *Alaternus*.

4*th*. *Celastrus*.

5*th*. *Ligustrum Vulgare*, or Common Privet.

6*th*. *Philyrea*. N. B. The *Myrtle-leaved Philyrea* is a beautiful, and scarce Shrub.

*Genesis 6c. 14v.

7th. Myrtle.

8th. *Myrtus Brasantica,* or Candleberry Myrtle.

9th. *Lentiscus.*

10th. Olive and *Oliaster.*

11th. *Granata Malus Punica.*

12th. *Syringa Lilac,* or Pipe-tree, and Persian-Lilac.

13th. *Jasmine.*—All these are but Shrubs.

1st. *Quercus Suber,* or Cork-barked Oak. At the front of Goodwood-House, the Duke of Richmond's, near Chichester, is one tree, twenty feet high, diameter of head forty feet, and stem nine feet circumference. There is another, thirty feet high, diameter of head sixty feet, and stem nine feet circumference. Round each is a Stone-kirb, in which is fixed iron palisades, to keep people from them. There is a third one of middle size. All their trunks are eight feet high, and were girt in the middle.

CHAP. XXVI.

1st. *ARBUTUS,* or Strawberry-tree.

2nd. *Buxus,* or Box.

3rd. Dwarf, or Dutch-Box. The Tree Box is a native of Bexley, in Kent, and Box-Hills, near Dorking, in Surry. The price on Hill was from three-half-pence to two-pence per pound, in 1810.—Seven varieties.

4th. Yew-tree, traduced character. It is propagated by Seeds, and makes famous hedges, thirty feet high.

5th. *Ilex,* or Holly. It is raised by Seeds, but like the Yew, it does not vegitate until the spring, twelve months after sowing.

6th *Pyracantha.*

7th. *Lauro Cerasus,* or Cherry-Bay.

8th. *Laurus Vulgaris,* or Sweet-Bay.

1*st*. *Of Arbutus*, there are nine varieties.

4*th*. *Taxus Baccata*, or Common Yew-tree. It makes the best and handsomest evergreen-screen of any other Plant; and will grow to timber of an excellent colour and quality. Its green leaves and young shoots are perfectly harmless for cattle to browse on; but if cut and wilted, or withered, so as to become half dry, and the cattle to eat it then, it kills them. I lost a cow thus, and after she died, I had her opened, and found the Yew in her stomach, so mixed, that it could not be brought up with cud for rumination. Since that, I saw an account in a Newspaper, of Lord Ilchester having lost twenty-five head of deer, in the hard winters of 1813 and 1814; the snow drifted and filled the sunk-fence; the Gardener employed his men in trimming the Trees and Shrubs in the Shrubberry; and the frost continued, so that the deer were enabled to walk out of the Park, across the sunk-fence, into the Shrubberry.

5*th*. *Ilex*, or Holly. There are twelve varieties of this beautiful class, most of them deserve places on Shrubberry-lawns. I have, in my Front Court, one Gold and one Silver Variegated Holly, sixty years old, whose stems are thirty-three inches in circumference, near the ground.

6*th*. 7*th*. and 8*th*. Are entirely for the Shrubberry.

CHAP. XXVII.

Of the Infirmities of Trees.

1*st*. TO which all elementary things are obnoxious, either from the nature of themselves, and in themselves; or from some external injury, as by winds, lightning, mildews, insects, and particularly cattle, as sheep, horses, and cows, must be guarded against incessantly. Fern and nettles may be killed by well beating them with a pole, two or three times in spring and summer.

2nd. Wet-woods to be drained by open trenches, as wet is exitial to many trees. Quantity and quality are of essential importance to the good health of trees, all of them sucking it in by their roots, which are their mouths.

3rd. Bark-bound Trees to be scarified, and the heads reduced in the spring.

4th. Terido Cossi, and other worms, are to be cut out by an incision, through the bark, dressed with loam, piss, and vinegar. The best means of finding their quarries, are to follow the Woodpecker.

5th. The Tarmes sometimes make such a noise in a tree, as to awake the Woodward from his nooning nap or sleep.

6th. The more rugose are the *Cossi*; of old was a luxury to epicures. Millipedes bring on morbid tumours, and pestiferous air breeds distortions, lachrymations, ulcers, &c. calf, wind-shock, knots, and rot. Shall I go on?

7th. Crooked trees are reformed, by taking off, or topping the preponderers, while charged with leaves. Excorticated trees are to have new bark bound on, from other trees, and plaister, or cere-cloth covering of butter and honey, (fudge.)

8th. Tanners' Ooze will keep of deer, hares, and rabbits, as will lime, grouting. It will destroy moss also.

9th. Ivy to be taken off. Fungi indicates a fault in the liver and entrails of trees.

10th. Wind-shaken or lightnings.

11th. Wind-shock by frost, prevented by shelter and timely pruning.

12th. Cankers, remedies for, are Tar-plaisters, &c.

13th. Hollowness in trees, caused by careless lopping and pruning.

14th, 15th, and to the end, belong to Gardeners and Orchadists.

The second section of this chapter says, "The roots are mouths." Dr. Hunter says, "The roots are the stomachs."

3rd. On Hide-bound Trees. Nothing can be more rational. The best tool for this operation, is the timber scribe, or rase, far preferable to the knife. To pretend to farther knowledge of diseases and prescriptions, would be taking up too much of my reader's time, to no good purpose; nor do I approve of quackery, among trees, any more than among Farmers and Graziers' stock. Tar is the best of all plaisters.

CHAP. XXVIII.

1st. COPPICES should be so laid out as to grow for several falls. In setting out the ground, leave the intervals in straight lines, from eight to twenty feet wide; they will be pleasant to the sportsman, and useful to get out the crops.

2nd. All sorts of ground serve for copsing, by adapting the variety to soil and situation, as the most boggy places, by being drained, and cast into ridges, and banks, or beds. Then on moist parts, plant Willow, Sallow, Alder, Poplar, Black-cherry, &c.; and on the dryer parts, Hazel, Birch, Ash, Chesnut, Sallow, and Sycamore. The greatest distance in planting, should never be more than five feet, as every fall renders them wider, even to thirty or forty feet, at five or six falls.

3rd. Age or time of cutting depends upon the quality of the wood, land, and market, viz. from seven to seventeen years, and even to twenty-five. If there is any Oak, if it runs to thirty years, there will be a seminary of young Oaks; suppose a copse of seventeen acres, laid out into seventeen quarters, then one may be cut every year for seventeen, in succession for ever.

4th. In Copsing legally, the first cut, there must be left for timber per acre thirty-eight, and some of these to be cut the next fall, and so on to the fourth fall, and there will then be four firsts, fourteen seconds, twelve thirds, and eight wavers: in all thirty-eight. *(Statute 35th, Henry VIII.)* The time of cutting is from the first of October, to the first of April; and all should be cleared by May-day, shut up, and well fenced.

5th. Pruning, Natural, is not to lop, but let the laterals of Oak rot, and fall off: not approved of by my pattern.

6th. Pruning, by MR. EVELYN, equivocates.

7th. and *8th.* I wave.

9th. Statutable Billets.—Three feet long, and seven inches and a half round; ten to fourteen such, reckoned as one, two, or three. A Stack of Wood, or Spray for Charcoal; twelve feet long, three feet wide, and three feet high; some places three feet and a half high. A Cord of Wood, viz. Billet-wood; is $8 \times 4 \times 4 = 128$ feet. Fagots; three feet long, and two feet round; made round and not flat. Woodland-Perch; is eighteen feet.

RECAPITULATION.—*1st.* In the first place, have a correct plan of the ground to be planted; upon the said plan draw the intended rides or roads, at discretion, according to its shape; if it is long, and not more than one hundred yards wide, one road up, or through the middle, will be sufficient, and one statute rod wide. After it is sown and harrowed, then set out the ride or rides, by putting in Poplar Cuttings, a rod apart; and at the first crop of copsing, they will be the guide for grubbing the road. But if you plant, then set out the rides and leave them open. I prefer planting; first, well fallowing, if strong land, recently inclosed; but if arable or pasture land, plant it immediately with good well transplanted Nursery Plants, three feet high. Where the Copse-wood is wanted chiefly for herdles and hedging, plant nothing but Hazel, Maple, Mountain-Ash, and the Grey-Sallow, or Withy;

and be careful not to admit of any of the Black-barked Withy, as it is brittle, from all soils whatever. If in the vicinity of Collieries, Potteries, or Glass-works, then add Birch. In all other situations, add Broad-leaved English Elm, Ash, Willow, Oak, and Spanish-Chesnut; as to Hornbeam, it is a slow grower. Beech cannot bear cutting for Copse-wood. Firs of any sort, not even the Larch, is admissible into Coppices or Woods; neither are Oziers, or Poplars: hence my motive for making the rides by them. Beech or Fir will do where Poplar is not at hand. Should the ground vary, as to wet, dry, calcarious, clay, &c. then vary the Plants accordingly. If any part be moory-bog, put Alder there, and not Oziers, as they would not thrive; nor should they be admitted into a Copse. Whoever sows for Coppices, I would recommend an accurate annual inspection; and where any place is too thin, dibble in some Seed half an inch deep. The Spanish-nuts will be easier obtained than our own Copse-nuts, for Seed; and previous to sowing or planting, they (also Chesnuts and Walnuts) should be put into a wire-riddle, and tar poured over them; after that, mix sand with them, and they will get into the ground by harrowing. There neither mice nor rats will molest them.

2nd. From the year 1795 to 1800, when wheat was a guinea per bushel, the Reports of the Transactions of the Bath Agricultural Society, and the Public Press, were very clamorous about Gentlemen's Parks and Lawns being ploughed up. In 1823, the Public Press, out of a sympathetic feeling for the farmer, who was selling his wheat at five shillings per bushel, and his beef and mutton at fourpence per pound, recommends to Gentlemen of landed property, to let all the new inclosures, and the worst of the old run into a state of nature. I wish it had occurred to them to have recommended the sowing and planting such sterile and superabundant land with Seeds and Plants of Forest-trees. As this has not been done I recommend it.

1st. Wet gravelly places, by rivers, that cannot be drained, to be planted with Ash, for poles. This in Northamptonshire is called an Ash-spinny.

2nd. Peaty, boggy, and moory places, to be planted with Alder;—hence Aldermoors.

3rd. Steep wet cliffs, to be converted into Alder-cliffs.

4th. Very wet narrow valleys and gulfs, such as are frequent in hilly districts, turn into an Alder-carr; have good Nursery Plants, three feet high, planted at five feet intervals; and they will soon be an ornament, if cattle are kept off.

5th. Hams of land, left by serpentining of rivers, frequently might be fenced off, at a trifling expense, and such Hams make the very best Withy, Willow, and Ozier Beds.

6th. Mounts, or Beds, formed by casting up boggy places, so as to be surrounded with water, render the place healthy and cheerful: these, when planted, are called Aites.

7th. Narrow Strips, inclosed from waste or otherwise, are called Pichle, alias Pingle, alias Pightel; such are convenient for the Nursery, or planting.

8th. Hurst, is any small Wood or Coppice, and part of a Forest.

9th. Holts, are inclosures, made in marshes for leuth to cattle, much wanted in the Wells and Glastenberry marshes, planted with Oziers, Withies, Willows, or Alder, as agreeable to soil.

10th. Wilderness of all the luxuries about the domain, or seat of an estate. This is the most captivating, when set out and planted with taste; it is also attended with less expense than any thing else near the mansion.

Mr. Marshall, in his Rural Economy of Southern Counties, says, "That in the Wealds of Sussex, they prune their trees to straight stems; some thin their Copses at first copsing to timber-tree distance at once; others save all the wavers they can at first, and keep thinning out the worst discretionally." Fagots four feet long, aud three and a half feet round, are fifteen shillings per hundred; and Lime-burners' Bavins, five shillings per hundred.

3rd. Verse, on Copsing; I call harvesting Woodland produce. Groves produce timber only. Woods produce timber and underwood. Coppices produce underwood only. Woods are generally called Spring-woods, alias Running-woods, promiscuously so called, although very different. In Spring-woods, the under-wood is cut, and some trees left at discretion, for timber. A more barbarous system cannot well be conceived. At every copsing, there are all the oldest timbers to be felled, and in their fall they cripple many of their posterity:—hence one cause of shaken timber, and always what is by Carpenters called White-heaved, viz. a kind of mouldiness mixed in the grain: after this process, and the Wood cleared out, the Woodwards, in Northamptonshire, get ladders, and with their bill-hooks, clear the stem of the tree up to its best laterals, from all broken limbs, stumps &c. This they call underdaging, which I conceive to be pruning, and of the most judicious kind. The only Running-woods I ever met with are in Buckinghamshire; and the tenant is bound never to cut any thing under twenty inches in circumference.

Coppices, intended as permanent and profitable, the owner thereof should never suffer any thing to run up to become trees, as they spoil the look of Coppice, and always do more harm to Underwood than they are worth; by the shade as well as drip from their heads.

4th. Verse, as to legal copsing, the Act was passed merely for Royal Forests, as Windsor-Forest, Epping-Forest, and Enfield-Chace; from whence London was principally supplied with fuel: now obsolete.

9th. Verse, On Billet-wood. That mode of reckoning or valuing is still practised in Beer-Forest, Holts, Wickham, and Waltham-Chace; also in New-Forest: they are adjoining each other in Hampshire. Stackwood and Cordwood measures, are the customary measures in all districts, that I am acquainted with.

CHAP. XXIX.

ON PRUNING.

1*st.* THERE could certainly be nothing more necessary, in order to good pruning, than a knowledge of the course and nature of Sap: it is a considerable part of natural philosophy. The manual operation is, to divest the tree from what is superfluous. The ancients found such benefit in pruning, that they feigned a Goddess presiding over it. A skilful planter should be early at it, cut close to the stem, and leave no stumps.

2*nd.* Pruning Tools should be a bill-hook, a hatchet, a hand-saw, an excellent knife, a broad chisel, and a mallet; all of the best quality, and kept in good order.

3*rd.* In shrouding Elms, do it often; as by waiting to have much wood, you get large wounds: always cut upwards, or under, to prevent the weight of the bough from tearing the bark.

4*th.* The benefit of tall trees are, the due pruning off the branches, and rubbing off the buds, to the height required. Yet some forbear pruning Oak, observing, that they much exceed in growth those that are pruned; and all trees intended for shade and ornament should be seldom pruned. It is by discreet leaving the side-boughs in convenient places, sparing the smaller, and taking away the larger, that you may advance a tree to what determined height you desire; thus bring up the leader; and when you would have that branch, and spread out, cut off all the side-boughs. Young trees may be pruned every year; and as they grow older, at longer intervals, as at three, five, or seven, &c. You will then have straight clean timber, when the knots are covered; and when you have done all you can, there will be enough crooked for wheels, kerbs, compass timber, and knees for Ship-builders.

7th. A good arborator will free his trees of moss, after rain, by currying the bole with an old wool-card, scarify, and cross-hatch. MR. EVELYN had the necessity of judicious pruning, so strongly impressed upon his mind, that before he gives a chapter upon it, he has introduced it in five preceding chapters, viz., the second, third, fourth, ninth, and the twenty-seventh chapters of Silva. In pruning single trees, in any situation, and particularly trees in Parks, the grand art is, to keep the head in a pyramidal, or conical form; and that preserves the leading shoots in such situations. Never prune the stem of the tree higher than from eight to twelve feet, for a clean stem; and as the laterals at that height, extend in length, their own weight will bring them down, so that the cattle will take care they do not get too low, by biting off all that come within their reach. I have seen deer at this work, reared up upon their hind feet. Should there be more than two branches at one place, cut them off close; it will frequently happen, that two shoots in the top will push up, so as to form a forked tree. To prevent a competition, the pruner should have two tools, shaped as per figure.

With a socket B. in one, should be a handle ten feet long, and in the other, a handle six feet long; the hollow or crescent A. is to be a sharp cutting edge; C. forms a hook.

With this tool, it is easy to shorten one of the leaders; and if the tree is so high as to be necessary to get up into it, the hook will be useful for hanging up in the tree, whilst the pruner has got into a proper position for using it. He will find it useful at times for shortening the rambling laterals: also for getting good Cuttings to plant in the Nursery. The tool should be about four inches wide. In pruning Hedgerow-trees, they may be run up to fifteen or twenty feet stem, but be careful never to go higher at any period than that: the height of the stem is not more than two-thirds of the height of the whole tree; but if it is allowed to be only one-half, it will swell the stem quicker, and be handsomer. I agree with Mr. Martin, who says, "The more head the more stem, provided the head is in the right place for feeding a good stem;" and I flatter myself, the above practical theory will obtain, and little more will be wanting, besides keeping the leading shoot central, until the tree arrives at its height; and that depends upon the nature of the soil and situation; and there the leading shoot will become nearly stationary, and the laterals will get up, so as to form the top into that natural bold curved summit, that is observable in most of the full-grown trees, where they have had room so to do: and so it is with the roots of all tap-rooted trees; they stop by the time the tree is five or six years old, and the lateral roots will, in ten years more, be as large as the tap-root. In ten years more, if the tree were to be grubbed up, there would not be the least appearance of a tap-root: and from this time, viz. twenty or twenty-five years old, until the tree is arrived at its full stature, the annual increase of timber is admirable, provided the trees have good heads.

N. B. I give a general challenge to all who choose to be of a different opinion, that there is not to be found in this island, a fine, tall, well swelled bole of a tree, that does not support an ample, well spread head, on pain of forfeiting my own head, which I consider as a proof, that branches and leaves are not robbers, but caterers. I am aware, that this is not a general opinion; however, I am not alone, but in good company. MR. PONTEY is the most acute writer I have met with on the subject. Let us see how he writes upon it. In the first place, we ought to write, not only so as to be understood, on so momentous a subject, but so as not to be misunderstood; and before we condemn other authors, we must ourselves be certain that we understand them. In the 54th page, is a definition of three trees, given on a plate at page 86, that runs counter to my practice. I am of opinion, that the tree, No. 1, will make by far the most timber, and is a correct model for a beautiful Park or Avenue-tree. No. 2 will have the best timber, although not so much of it; but such is inadmissible in general as a Lawn or Park-tree, and only fit for Hedge-rows and Groves. He says, "Taste is founded on the fashion of the day;" so there is no real judgement to guide the taste of an arborator, or a landscape gardener. Let any one paint upon his imagination, a fine Park, studded with MR. PONTEY'S beautiful trees, with naked stems, of forty or fifty feet high, and the old fashioned trees, such as are usually found there; and then pronounce which is vicious, and which is true chaste and fashionable taste.

In page 78, he quotes a Dr. Smith's opinion, who says, "That every branch and leaf is a caterer, for food as well as every root and fibre." Here, Mr. Smith and I agree. MR. PONTEY says, "They are thieves and robbers," and sends Mr. Smith into banishment. Now, I quote MR. PONTEY, page 156, "Branches seem to be the means of producing and maintaining a certain quantity of leaves, which act in such a way, that through them, a communication is kept up with the atmosphere, probably they collect a considerable portion of matter from it; in fact, we believe their assistance is absolutely necessary." Pray, MR. PONTEY, recall Mr. Smith, and beg his pardon, and confess your error, by telling him, that you cannot prove your negative.

In page 123, he says, "Dead tops, where the trees are not very old, nor the soil bad, are occasioned by the neglect of pruning, or a bad method of doing it." It is for want of timely thinning, in my opinion, and that is the bane of most of our crouded woods and groves, for want of caterers.

In page 208, he says, "Firs are sometimes too severely trimmed, that the heads are left too small; then the sudden exposure stints them so as never to recover." He might have added, that the neglect of thinning close woods and groves would draw up the trees to be tall, with slight heads, to be a severe trimming also; and when thinned seldom recover. He is aware of the effect, but not of the cause: the cause is not the effect of cold being let in, but the want of caterers, viz., a want of head to feed the stem.

In page 13, he acknowledges having read both books and men, and discards them *enmass*, as ignoramuses, but makes one solitary extract in the 16th page, merely to cavil at, from my pattern. *(See fourth verse of this chapter.)* By so doing, he has hanged himself up, upon the horns of a dilemma.

In page 179, he adopts the very same mode of pruning; and again at page 161, there is a plate, with two trees, represented as in a state of nature, of different ages; and on the same plate, there are the same trees, represented as pruned. It is as clear to me as my own existence, that he delineated them by MR. EVELYN'S description; if he did not, it is a proof, that his ideas run parallel with those antiquated authors he affects to despise; and, that he is not capable of thinking any better on the subject, than they did. Unfortunately for himself, while drawing his picture, he forgot that he was, or ought to be drawing a miniature representation of a Forest-tree; but he has given us two of his Nursery trained-up stocks, for budding or grafting upon. Now, had I pruned two such trees, from No. 1, I should have taken off three of the under shoots, and no more; and from No. 3, I should have taken off seven of the lowest, or under branches; and three-fourths of the left hand leading shoot, at o.

In page 139, he says, "Nature planted, and cattle pruned." This is not true; Moses Cook, on Forest Trees, 1724, now 1824, says, in the 60th page, "That trees, standing alone, have generally a clear body, of six, seven, eight, or ten feet high." I only ask whether such a body of timber had knots? Now, I tell you it is cattle that crop off the boughs: if they were taken off, it would be as easy to get sixty as six feet, and as straight. Is this plagiarism, or literary piracy, in MR. PONTEY?

Page 172. "If plenty of long, clean, straight, free-grown trees could be got, there would be no want of crooked, for knees, ribs, &c. for ships:"—so said Lawson, as quoted by MR. EVELYN, page 184.

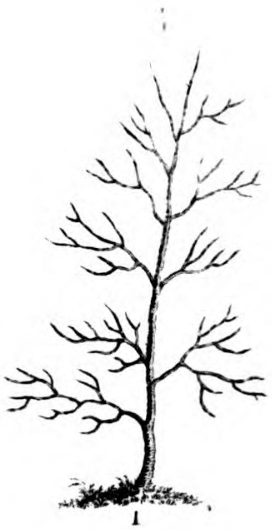
I should not have animadverted thus, if MR. PONTEY had not doomed all other authors to oblivion, and branded all professional men with ignorance: but a truce, lest I render him like the daw in the fable, that had plumed itself with feathers not its own.

In page 225, he writes of amputating limbs, six inches diameter; if such limbs were sound, I think he destroyed what would have made good knee-timber for a ship. If it were not sound, the saw was applied at the wrong place.

In page 14, he discards all authors and wood-men, and plumes himself upon taking reason as his guide, in assisting nature. Now, if this is either assisting nature, or acting with reason or discretion, I confess my inability in not understanding him, any more than the generality of his readers; who have spoiled the rural appearance of

he forgot that he was, or ought

Page 91



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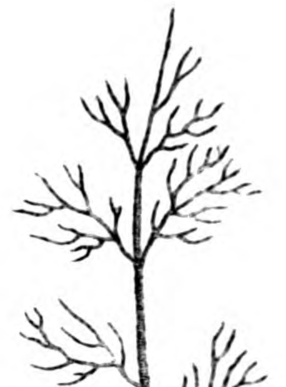

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many plantations all over the kingdom, by pruning the outermost trees of such plantations, the same as the interior; and spoiled their picturesque appearance, and made them appear as ridiculous, as King David's Ambassadors among the Ammonites.* Perhaps it is an error in my judgement, as he does not admit of any rational taste, but ephemeral, or caprice of the day.

In the twenty-fourth Volume of the Transactions of the Society of Arts, Manufactures, and Commerce, there is a plate, exhibiting eight specimens of knots, as cut out of Fir-trees, by Mr. Salmon, of Woburn, Bedfordshire, with remarks of good and bad pruning: they are similar to those engravings of MR. PONTEY'S. Mr. John Hill, M. D. wrote a Treatise on Timber, in 1770, in which, is an engraved plate, page 102, with five similar specimens: this work far exceeds any thing else I have ever met with, on the nature and construction of timber-trees. Much has been wrote upon the subject, both as to nature and art, in the training up of trees; also as to sap: but we frequently overshoot the mark; nature has established rules of her own, for each production, in the animal, as well vegetable creation. Testaceous fishes have their bones on their exterior; the finny tribe have bones right through the centre; and birds and beasts' bones are distributed through the members. So it is with the vegetable creation.—Culmiferous is strengthened by joints;—leguminous legumes on the outside. These are all arbitrary, and will not bear molesting. It is not so with trees; their knots may be compared to bones; and the attempt to grow timber without knots, would be as absurd as to expect fish or flesh without bones; but the knots can be checked, so as to make the tree nearly free, up to what the pruner may deem the most convenient height, for producing the greatest

*2nd Samuel, 10th chapter, and 4th verse.

quantity of good timber. If the head is allowed to form at fifteen or twenty feet high, and ample room to spread; it will feed the bole nearly to a cylindrical form. If it is run up to thirty feet, it will be more tapering; and so on to forty or fifty: and if carried above that, our climate will not support it; therefore I consider twenty to twenty-five feet bole, to be a mean that will produce the heaviest crop of good timber; and it rarely happens that longer lengths are wanted, of Oak for buildings.

Poplars, Arbeels, and Firs, may be run up to thirty or forty feet, to advantage; but if forced above that height, the general crop of good timber will be lighter for it; and if the pruner stops here at forty, there will be many trees that will go ten feet farther of themselves.

Suppose now a plantation of Firs, one year old, and all the bottom tier of shoots taken off; and another tier at two years' old: after that, Mr. Pontey shall take one half of the plantation, and prune as he pleases, fifteen or twenty years; and the other half of the plantation shall not be meddled with in that time; but, at the expiration of the fifteen or twenty years, it shall be pruned close, and as high as the pruner can reach, (say, seven feet,) it will be found that the neglected part, will be the most valuable: and as to the knots, they will be so small, and near the corona, and core, that they will be no detriment. The next prunings should be in every five years; but, previous to pruning, thin discretionally, and that discretion will be best ascertained, by attending to the tops, to see they have room for another five years' growth, without crouding; and after you have got a clean stem of thirty feet, take care the heads never interfere with each other, by the extension of their laterals; as it is by them your timber is to be fed, which they cannot do, if cramped for want of room. If you wish to preserve the rural beauty of your plantation, recollect, your outer lines be thinned, but not pruned.

CHAP. XXX.

FELLING TIMBER.

THE time or age to fell at, is when the tree has got to its utmost state of perfection. They have three stages of life: one third is growing; one third consistent or stationary; and one third in decaying:—and so it is with animals. Here MR. EVELYN gives us a long detailed account of numerous and monstrous trees; amongst which, is that Beam of Larch one hundred and twenty feet long, and two feet square, all its length; it was brought to Rome in the Emperor Tiberius' time. Amongst the rest, is an account of a Fig Tree, that grew in the Caribbee Islands, which emitted such large buttresses, that planks for floors and tables, were cleft from them, without any prejudice to the tree. I have myself read of the Abyssinians cutting beef steaks from their live cattle without prejudice. Those who are credulous enough to believe the one, will be no sceptic at the other: however I wave transcribing them here as apocryphal; nor did my author believe them, as he hints at the marvellous novelties; however he gives an account of Firs in this country, being one hundred and fifty feet high, and Ashes in Essex, one hundred and thirty-two feet high. At his own home, Wotten, in Surry, was an Oak Table, nine and a half feet long, above five wide, and six inches thick: also a table, at Dudley Castle, Staffordshire, made of an Oak plank, that was seventy-five feet long, and three broad, the whole length. An Oak in Worksop Park, Notts, forty feet high, without bough or knots, that would square two feet at top.

Another Oak broke up, that produced fourteen hundred wair of boards: a wair is one hundred and twenty boards, six feet long, one foot broad, and pricked for sawing, half

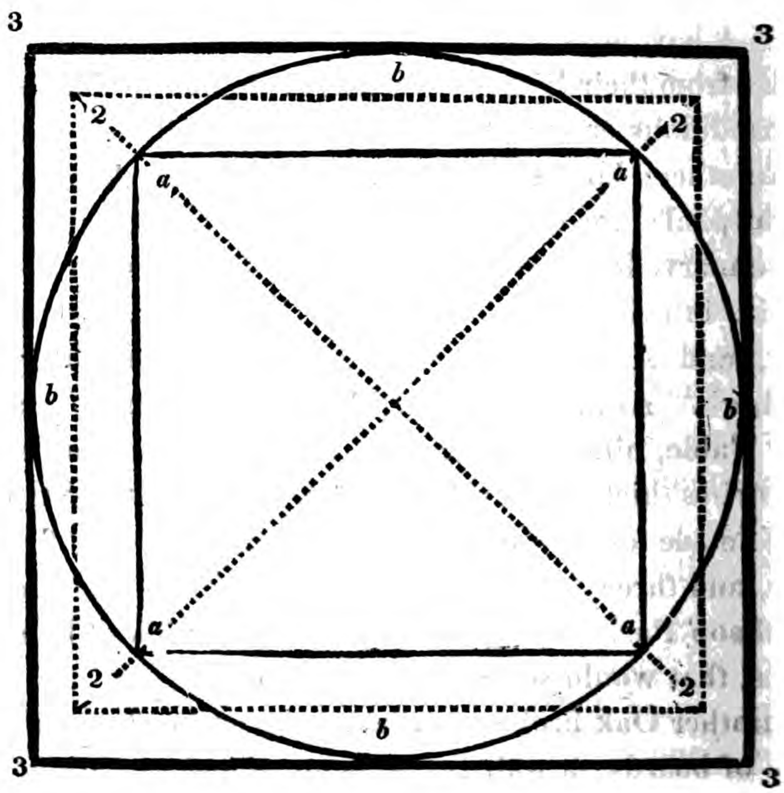
N.

an inch thick; so that there are thirty cube feet in a wair. The head was estimated at twenty cords, its diameter was sixty yards. Half the diameter multiplied into half the circumference, gives the area, that is two thousand seven hundred and twenty square yards under its shade; it grew in Sheffield-Park, Yorkshire.

In this fifteenth section of Silva's chapter of felling timber, there is a mean given for the extent of trees; limbs measuring from the bole to their extremities, are fifteen and a half yards, doubled give thirty-one yards; the ratio of diameter to circumference, is $\frac{113}{355}$

Then, as 113:31::355:96.6 the circumference. Now, half of 96.6 is 48.3, multiplied by 15.5, the half of the diameter gives 748 square yards for area, or six and a half such trees per acre.

Another in Worksop Park, fallen and measured ten feet clean stem, and thirty feet circumference.



If a square, whose side is two feet, as *a. a. a. a.* be inscribed in a circle *b. b. b. b.* The proportions of, or at that circle are, diameter, 2 feet and 8284 parts: circumference, 8 feet and 8858 parts: area, 6 feet and 2831 parts: area of square 2. 2. 2. 2. 6 feet and 2831, equal: to the circle and its sides, are 2 feet 6 inches.

Now, by the common mode of girting with a string drawn tight, then folded four-fold, so as the folds hang over the end of the rule, gives twenty-six inches for the side of the square; or two feet and sixty-eight parts. The outer square 3. 3. 3. 3. is what the timber merchant sells, viz. just eight feet area what he buys for little more than four and a half. He buys fifty feet to a load, and sells forty.

N. B. The outer square becomes tangents to the circle at *b. b. b. b.* and the merchants in squaring, hew off no more, and take the diameter with calipers.

Green-dale Oak, at Wellbeck, Nottinghamshire, as measured in 1662:

	Feet.	*Inches.*
At one Foot above ground	33	1
At two Feet.........do................	28	5
At six Feet ....do................	25	7
Diameter of Head	88	0
Total Height	81	0

There were three limbs broke off at that time, and eight others remaining fresh and sound. I saw the remains of this monster on the 3rd of October, 1816. Little is left besides part of the shell, twelve or fourteen feet high, with a few green leaves.

On the same day, I measured two other monsters there, called the Two Porters. One measured thirty-three feet in circumference, at the ground; and at four feet high twenty-two feet: total height of the tree, sixty-seven feet: contents eight hundred and four feet. The other measured thirty-six feet at the ground, and twenty-seven at four feet high: total height of the tree, seventy feet: contents, one hundred and sixty-three feet, with the bark. They are almost perfect cones, with few branches, ugly monsters, and neither of them sound; feathered with laterals to the ground: of course, they never have been pruned, hence their tapering, like a church spire.

Mark-well; by customary way of measuring, one contains six hnndred, and the other eight hundred and fifty feet, by slide-rule.

MR. EVELYN goes on: one Oak of Lord Craven's, in Shropshire, yielded nineteen tons and a half of timber, twenty-three cords of wood; two loads of fagots, and two loads of bark. He tells us, "Forty-three feet of timber make a ton, and fifty a load." I wish he had told us what a load of bark was. If he meant statute loads, there were four tons and a half.

19*th* Section on annual increase of timber, or meridional rings, as appears by the transverse section of a tree. By cutting a Fir above a knot, and again under that, there will be one ring more in the under cut, than in the upper; and also, there will be as many joints above the upper cut, as there are rings in it.

22*nd*. Section says, "The bark is produced from the wood, and not the wood from the bark." *(Ant. Van Leeuwenhoek.)*

25*th*. Section on peeling Oak; standing and felling in the following winter, in order to season the timber.

26*th*. Says, "The season for cutting Fir, is just as they are beginning to bud."

28*th*. Disbranching or lopping, prior to felling, to prevent damage in falling.

31*st*. Grubbing preferred to cutting by saw or axe, on account of the value of timber at the kerf-place.

33*rd*. On timber measure, by which, the seller loses one-fifth of his timber.

36*th*. An Oak-wood metamorphosed into a Beech-wood, and afterwards supplanted by Birch; whence this sympathy and affection is difficult to resolve. (Page 213.)

I wish MR. EVELYN had treated us with the description of the timber-gins, and carriages, of his day; instead of sawing and boring machines.

In the year 1802, whilst doing some business for a Gentleman, in Somersetshire, I was conducted to a place in Gloucestershire, called Ashwick, five or six miles north-east of Bath, to measure three Oak-trees, then growing in a pasture, called Razies Bottom.

	Feet.
1st. Called Queen Oak; clear bole 30 feet high, and 16 feet circumference, perfectly cylindrical, ...	600
On the Top were two noble erect Spires, each 40 feet long, and 8 feet circumference, at the off-cut place, ...	80
	680
2nd. Called King Oak; 30 feet stem, and 18 feet circumference, at the middle, or mean girt, ...	770
3rd. Called Duke of Gloucester; stem 25 feet high, and 14 feet circumference, ...	394
	1844

N. B. The first is thirty-four feet in circumference, at the off-cut place. The second is twenty-eight feet eight inches in circumference, at the off-cut place, and would actually square, at one foot above the ground, seven feet; and close to the ground, eleven feet by ten. I found in the side of this tree, a hole, large enough for a small sheep to get in at; and the interior hollow was three feet wide, and four or five feet high. (Quære) What is become of the timber that once occupied this cavity? Is it decomposed by the dry rot, and escaped in vapour and moist air? If so, how came the dry rot there? (Answer) Exclusion of the benefit of the sun and air, by the monstrous bulk. What is become of the tap-root?

In 1817, I saw groups of Oaks, at Wentworth-House, Yorkshire, whose circumferences were, from six to twel feet, at four feet high; and forty feet stems, forty feet apart, and seventy feet to the tops.

The best Oak in Worksop-Park, Nottinghamshire, is fourteen feet in circumference; and the soil is red, marl, and wet. At Wellbeck, I saw a group of Oak in a Park, called the Wilderness, thirty-two trees on one hundred and forty-one rods of ground; or thirty-six per acre, at ninety feet high. Some of them exceed what I class the first-rate: they are too good for the family of monsters; therefore, I shall call such lordings. One measures, at five feet high, sixteen feet and eight inches; clear stem fifty-five feet: some are sixty-five feet clean stems. Average of the boles:—height forty-five feet. The lording has three hundred and eighty feet of timber in it; and they average two hundred and two feet per tree, viz. seven thousand two hundred and seventy-two feet, or one hundred and forty-five loads, worth £20. per load, standing £2900. I doubt, whether there is another acreable produce of timber in England, equal to this, of any kind; either in weight or value. For the average distance of trees, and other particulars, I am under an obligation to his Grace the Duke of Portland; also to Mr. Thompson, the Gardener, and Mr. Quick, the Woodward, for the masterly manner in which they executed his Grace's orders, in furnishing me with the above particulars.

In Fawsley Park, Northamptonshire, there is an avenue and a grove, in lines, thirty feet apart each way; and the boles are from eight to fourteen feet in circumference; and the trees are from fifty to eighty feet high, in strong, yellow, marly loam. Who can object to planting for fear of success, by losing the tap-roots thereby, after this specimen? The Park is hilly, and the Vales mostly planted, which have a pleasing effect, when viewed from the hills above; their tops look like bold clouds rolling one behind another.

At Stow, in Buckinghamshire, I saw a gravel-pit, twenty-five feet deep: on the edge of it, stood an Oak, sixteen feet and a half in circumference, eighty feet high, and sixty feet diameter of head. In a marshy part of the Park, is one, twenty-four feet in circumference; and at four feet high, eighteen feet in circumference.

N. B. Four feet is, I repeat, the height at which I take all circumferences.

The height of the tree is fifty feet, diameter forty feet.

	Feet.	*Feet.*	*Feet.*
One at	$14\frac{1}{2}$ circumference,	100 high, and	100 wide.
One ...	17 .... do.	70 ... do. ...	70 do.
One ...	19 .... do.	60 ... do. ...	60 do.

N. B. Ten to twelve feet is a medium circumference of thousands, mostly planted in numerous avenues, vistas, and rides; besides groves. Ashes thirteen feet in circumference, one hundred feet high, and sixty feet wide: they break up red, on account of the tenacious, yellow, clay-marl that they grow in, being too moist; the consequence is, Elm and Beech are not good.

In Blenheim-Park, Oxfordshire, are plenty of Oaks; some sixteen feet in circumference, and from thirty to fifty feet high; but none sound above twelve feet in circumference. The boles are from eight to fifteen feet high. On the north side are vast groves, planted at thirty feet distance, sixty feet high, and the boles from ten to eighteen feet in circumference. One group of Oak and Ash mixed, is eighty feet high: boles eight feet in circumference, and twenty feet apart.

At Hagley-Park, Lord Foley's, in Worcestershire, there is one Oak, twenty feet in circumference, and forty feet high; and another fifteen feet in circumference, and sixty feet high; some twelve feet in circumferenee, and fifty feet high; and others ten feet in circumference, and seventy feet high. Those in the grove are seven feet in circumference, and from eighty to ninety feet high. There is a grove of Ash and Fir, one hundred feet high, spoiling for want of thinning.

At Patshall, Sir G. Pigott's, in Shropshire, are groves of Oak like Stanstead Beech, whose stems are from twenty to fifty feet high; circumference, ten feet: and trees eighty feet high, being thirty-five feet apart.

At Mr. Gifford's, Chillington, Staffordshire, are Oaks eighty feet high, and fifteen to sixteen feet circumference.

Near Bentley, in Suffolk, is a district of two or three miles well clothed with Oak; some of the trees eighteen to twenty feet in circumference. Euston-Park, celebrated for fine Oak, by Mr. Evelyn; now very naked, the mansion stands on a naked plain, as if put down from some vehicle, and intended to be removed to its destination afterwards. There are a few old Oaks in a recluse corner, as if they were retired for fear of sharing the same fate, as their deceased brethern; however they stood whilst I measured them, one of which was sixteen feet in circumference. At five miles nearer Burry, St. Edmonds, are some fine Oaks, one of them twelve feet in circumference: they belong to a Mr. Acton.

At Thorndon Hall, Lord Peter's, in Essex, are Oaks twelve feet in circumference.

At Lord Egremont's, Pettworth, Sussex, are Spanish Chusnut Trees, sixteen feet circumference; and Oaks, nineteen and twenty, with tops 60 × 60.

In the Park of Lord Sheffield, Sheffield-Place, Sussex, is an Oak, whose stem was eighteen feet circumference; head, sixty-six feet diameter; contents, three hundred and fifty-five feet of round timber: and in the garden is one that was, in the year 1815, just seventy years old.—Diameter of head, seventy-five feet; stem, ten feet high, and twelve feet in circumference. At Stanstead, are five ugly monsters; one of them sixteen feet in circumference, and the next to it, nineteen. One Beech sixteen feet in circumference.

At Strathfieldsay, Hampshire, near Reading, are Oaks, belonging the Duke of Wellington, ten feet circumference.

In Melberry-Park, Dorsetshire, belonging the Earl of Ilchester, are first-rate Oaks; twelve to fourteen feet in circumference. There is one called *Billy Wilkins*, fifty feet high, spreads sixty feet; stem eight feet high, and thirty feet circumference at the smallest part, and thirty-seven at the kerf-place. It is as curly, surly, knotty an old monster, as can be conceived: and if cut now, whilst sound, (and heavy, marbled-grained furniture are in fashion,) I have no doubt of it being worth a guinea per foot. Its contents are five hundred and seventy-two feet. In Sherburn-Park, the property of Lord Digby, are old Oaks in abundance, from twelve to twenty-two feet in circumference.

In Devonshire South, are first-rate Oaks, belonging Lord Courtney, and Sir T. Ackland.

In North Devon, at Filleigh-Castle Hill, belonging Earl Fortescue; are Spanish Chesnut trees, one hundred feet high: and Oaks;—one, ninety feet, spreading head, supported upon a bole sixteen feet high, and sixteen feet circumference; another, twenty-five feet bole, and thirteen feet circumference; a third, nineteen, and a fourth, twenty feet in circumference.

At Mount-Edgecomb, Cornwall, is a Spanish Chesnut tree, thirty feet clean bole, and twelve feet circumference. Oaks, eighty feet high, and nine feet in circumference.

At Lord Paulett's, Hinton, St. George, Somersetshire, are Oaks, fourteen to fifteen feet circumference. Beech, eleven and a half, and Sycamore fourteen feet circumference.

At Wardour-Castle, Wiltshire, are Oak Monsters, twenty-three feet in circumference. At Fonthill, are some first-rate trees. At Longleat, are Oaks, thirty-five feet clean stem, and sixteen feet circumference: another, sixty feet high, and sixty feet wide; stem twenty-one feet high, and twenty-one feet in circumferenee. It is handsome but not sound. Besides these, there are at that place;

One at Ninety	Feet high,	and Twelve	feet circumference.
One at Eighty	do.	and Sixteen	do.
One at Seventy	do.	and Seventeen	do.
One at Sixty	do.	and Nineteen	do.
One at Sixty	do.	and Twenty-three	do.
One Ash Fifty feet Stem,		and Nine	do.
One Elm, in the Shrubberry,		Sixteen	do.

These prove heads of trees to be caterers for stems or bole; as the taller the tree is, the smaller the bole.

In mixed group, are Oaks whose clear stems are,

One at Twelve	Feet circumference,	and Forty	feet high.
Two at Fourteen	do.	and Thirty-five	do.
One at Fourteen	do.	and Thirty	do.
One at Sixteen	do.	and Thirty	do.

In Windsor-Park, Berkshire, are Oaks, fifteen feet circumference, stems, ten feet: twelve feet circumference, and stems, twenty feet: ten feet circumference, and stems, thirty feet. In Little-Park, is one, twenty-five feet circumference, and seventy feet high.

In Penn, alias Stoke-Park, Buckinghamshire, is an Oak tree, eighteen feet in circumference. At Barne, near Beaconsfield, is a mixed grove, planted by Waller, the poet; now eighty to ninety feet high, and eight feet in circumference; which wanted thinning, in 1819.

In Bullstrode-Park, are trees, sixty feet high; and six, eight, and twelve feet circumferences. One, seventy feet high, one hundred and twenty feet diameter; stem, twenty feet, and fourteen feet circumference. Near the House, is a group of Oaks, one hundred feet high, and from twenty to sixty feet apart, or average forty; and from thirty to sixty feet clean stems; and will average eleven feet circumference. One Ash, measured 13 × 100. The average distance of these trees, gives twenty-seven per acre, or four thousand seven hundred and seventy-nine feet; viz. ninety-five loads, and twenty-nine feet. N. B. One-fifth added for conic segments, or sections, will be five thousand seven hundred and thirty-five; viz. two hundred and eleven feet per tree, or one hundred and fourteen loads, and thirty-five trees per acre. Perhaps I may have estimated their elevation at ten feet too much; if so, the acreable produce will be 102$\frac{6}{10}$ loads. Compare this with Wellbeck Wilderness, which at once proves the superiority of a porous, silty, soil; that never bakes, so as to interrupt perspiration; i. e. evaporation: and that of Bullstrode, a strong marly loam, subject to bake; substrata chalk. Therefore, better, firmer, or finer grained timber cannot grow. There is some credit due, I think, to his Grace's ancestors, for judiciously ordering the thinnings according to soil: twenty-seven trees per acre, upon Bullstrode rude soil; and thirty-six per acre, upon Wellbeck polite soil.

Greenwich-Park, Kent, is famous for Spanish Chesnut trees, and first-rate Elms: and near the Royal Observatory are some monstrous Oaks.

At Knowl, Duke of Dorset's, is one rude monster, forty feet high, and its stem twenty-seven feet in circumference: another of forty feet high, and seventeen feet in circumference: and another fifty feet high, and fifteen in circumference. There are grove Oaks from eighty to one hundred feet high, with stems from eight to eleven feet in circumference. There is also an avenue of Oaks, twenty-four feet wide, and thirty feet in line, which measures as per grove:—Beeches one hundred and ten feet high and wide; stems from fifteen to twenty-three feet in circumference.

At Harefield, Middlesex, there is an Oak, whose stem is fifteen feet high, and ten feet in circumference. At Southgate, Duke of Chandoes, is a tree that spreads one hundred and twenty-eight feet. The stem of this Oak is ten feet high: at one foot and a half high, it measures eighteen feet in circumference; at five feet high, it is fifteen feet in circumference; and at nine feet high, seventeen feet in circumference. At Sweakley, are some, from twelve to fourteen feet in circumference. At Caenwood, Lord Mansfield's, are first-rate Oaks and Spanish Chesnuts.

At Esquire Bakers, near Hertford, Hertfordshire, there are numbers of Oaks, sixty feet high, and fifteen feet in circumference: and on the opposite side of the River Lea, Lord Couper's, of Coln Green, on a hill, there is an Oak, whose stem is seventeen feet in circumference; it supports forty limbs, that are eighty feet high, and spreads eighty feet. In Ashridge-Park, Duke of Bridgewater's, are Oaks, sixteen feet in circumference. In More-Park, are Oaks, whose stems are twenty feet in circumference; Lime-trees, twenty feet in circumference; Beech-trees, twelve feet in circumference; and Elm-trees, thirteen feet circumference. They spread one hundred feet, but are all Pollards. The Duke of Monmouth had this place; and for his treasonable practices, was beheaded, in the year 1685, and his property confiscated; then his Dutchess ordered all the trees to be capitated. It was planted after the manner of Greenwich-Park, groves, and vistas. Cashioberry-Park, belonging to the Earl of Essex, was planted by Moses Cook, cotemporary with Mr. Evelyn, and author of a valuable little Treatise on Forest Trees. Here are Oaks, ten and some twelve feet in circumference. A Lime-tree avenue, ninety feet wide, and twenty-four feet distance, in lines. An Elm-tree avenue, one hundred feet wide, and sixty feet distance, in lines. An Oak Grove, seventy feet high; heads, fifty feet wide, supported by stems, thirty-five to forty feet clean, and seven feet in circumference. Spanish Chesnut grove, average distance, twenty-seven feet, and seventy feet high; circumference of stems, eight to twelve feet, call the average nine feet, will be two hundred and sixteen feet per tree; and sixty trees per acre are twelve thousand nine hundred and sixty feet, or two hundred and fifty-nine loads and ten feet per acre: they are ripe, and want felling, which prove by their quick growth, they are not so long-lived as Oak. It proves at the same time, their value in preference to Oak; as the bark is as valuable, and the timber more durable. Walnut-trees and Ashes eighty feet high; clean stems forty feet, and eight feet circumference; heads spread sixty feet. Beeches twelve feet circumference, and ninety feet apart; heads meet. Cedar of Libanon, nine feet circumference, and forty feet high.

Woburn-Park, Bedfordshire, the Duke of Bedford's. In this Park, are some hundreds of first-rate Oaks, from ten to sixteen feet in circumference of stems: and some fifty feet, clean stems. In Amthil-Park, there is a sand-hill, with Oaks on it, sixty feet high; and boles, eighteen feet circumference.

Kimbolton-Park, Huntingdonshire, the Duke of Manchester's. In this Park, are Oaks sixty feet high, and stems fourteen feet circumference.

Northamptonshire Rockingham Forest Oak, breaks up red, on account of being near lime-stone. In Rockingham-Castle Park, are Oaks sixty feet high; stems, sixteen feet circumference.

Rutlandshire: at Burley on Hill, Lord Winchelsea's, are Oaks, eighty feet high, whose stems are twelve feet in circumference.

In Warwick-Park, Warwickshire, are Oaks sixty feet high, and eighteen feet circumference.

In Derbyshire, are first-rate Oaks, belonging to the Duke of Devonshire.

At Mr. Brook's, Buckland-Hill, Cheshire, is a curious monster, whose stem is twenty-four feet circumference, and eight feet high; out of which, rise four limbs, as if they grew in an immense tub: they are sixty feet high, and spread sixty feet. In a hedge, is one, ninety feet high, and spreads ninety feet; its stem is thirteen feet circumference. At Durnham-Park, Lord Stamford's, near Altringham, are some first-rate Oaks, and the best Scotch-Fir, I ever saw.

Townley, near Burnley, Lancashire, is well timbered. There is one Oak with a twenty feet bole, and fourteen feet and a half in circumference.

At Studley-Park, Yorkshire, is an Oak-Avenue, ninety feet wide, trees sixteen feet and a half in lines from tree to tree, and ninety feet high; some of them ten feet in circumference, and some single trees, twenty feet in circumference. Here are also Spanish Chesnuts of the first-rate. At Castle, Howard, are Oaks, sixty and seventy feet high; one is nineteen feet in circumference of bole. In a Vale, at the foot of the mores, three miles west of Hebden-Bridge, and seven hundred feet above sea, at Green Hill, belonging to John Mitchell, Esq., is an Oak; its stem is twenty feet, circumference thirteen feet, fifty feet to the top, and thirty feet wide. Also, Ash and Fir of the first-rate.

In Bishop Aukland's Park, Durham, are Oak and Spanish Chesnut-trees of the first-rate.

Lord Tankervill's, Chillingham-Park, Northumberland, is within sight of the Cheviot Hills: it seems as if it were hung up by the north east corner; and the lower part well clothed with first-rate timber, but degenerates gradually as the ground rises, to mere dwarfs. Here I saw the Aborigine, or ancient breed of cattle, white with red ears, horns a good size, and inclinable to as erect a position as Scots or Irish; weight, about thirty-two score, if fat.

Having detailed my survey of the timber, that has happened to come under my inspection, in twenty-nine counties, I do not wish to be understood as having included all, no, nor all the best. The result is, that the extreme height of English trees is one hundred and twenty feet; a mean or medium to that is sixty feet, for the lesser extreme.

	Feet.
	120
	60
General average of Grove timber, 90 feet, as	2) 180 (90 feet.

It is evident, by this list of extra grown Oaks, that the size or weight of timber is governed by the distance from tree to tree, as the tallest is invariably of the least circumference, as well as the heads being of the least diameter.

Next question solved, is the general average of a clean stem, which is half the height of the tree, viz. from thirty to sixty feet; and the distances from tree to tree, above one-third of the height; that will be from twenty to fifty, or thirty-five feet average. For, in thinning groves, it is not possible to keep the trees at equal distances; as by felling one whose head crowds, three or four will make a vacancy of from forty to sixty feet.

There is but very little old timber in the Island, besides the avenue and grove timber, the reason is obvious; single trees could be cut and scarcely missed; but these groups and avenues are almost sacred. There are neither groves nor avenues of a prior date than those of MR. EVELYN'S, and they are noble living monuments of their founder; and have out-lived most of the mansions, they were intended to adorn.

The 22*nd*. Section of MR. EVELYN, treats on Felling Timber. In Yorkshire, they peel all standing, and fell in autumn or winter:—And so does his Grace the Duke of Richmond, in Sussex. In many other places they fell the trees, and then peel the bark off afterwards. The first thing the Woodman does, is to look up to the head of the tree, to see which way it is to fall; and if there are any limbs on that side, on which it is to fall, then a ladder is reared, and such limbs are notched deep on the underside; or if the tree is lopsided, the head is lightened by chopping off the limbs. The first operation is, to prevent the bole from being fractured by the fall: the second is, to prevent the tree from splitting at the butt, when weakened by the saw; then the ground is cleared out of the saw-way, and a deep notch cut on the side whereon the tree is to fall; then on the opposite side. They begin sawing as close to the ground as possible, and saw on until the saw wants relieving by iron wedges, which are to be driven in behind the saw; then saw farther: and so on, when the trees are four or five feet through. Some of the wedges should be from fifteen to eighteen inches long; and when the tree happens to lean the wrong way, the kerf or saw-gate will be so wide, by the rising of the tree, as to require large wooden wedges. When the saw is got near enough to the notch first cut, the handle at the small end of the saw is taken off, the saw drawn out, and the wedges driven in with a beetle, first one and then another alternately, until the tree falls. When the operation of stripping takes place, by notching the bark into length, as the custom may be: some are three feet lengths; ours were twenty-five inches; and when the tree is stripped, the bark is laid on the ground, with the flesh-side downwards, one length upon another, to two or three feet high, to prevent its rolling or curling into a round form: and there it lies to wilt or soften, as long as it is safe not to get mouldy; then forked stakes are fixed in the ground, and rods laid in the forks, at about eighteen inches high; against which the bark is reared, on both sides, just thick enough to touch each other, double set; and the broken pieces serve to cover vacancies: then a range of the best is laid all along the top, like ridge-stones, or tiles to a house. Sixty yards of these ranges are called a load, for which the strippers have twelve shillings and four-pence half-penny. One shilling and six-pence per load for felling timber, and one shilling for every tree they have to lop, previous to falling. Sussex West.

There were one hundred and fifty trees grubbed up, at Fawsley, in Northamptonshire, in the year 1794, and not one of them had a tap root, although they grew where they had risen from seed. The woodwards had, for grubbing, one shilling in the pound, on the sale price of timber only.

Forty-two trees in Preston-Wood, produced two thousand two hundred and twenty-six feet of timber, or forty-four loads, and twenty-six feet; viz. fifty-three feet meetings, or per tree. These were sold by auction, and averaged one shilling and sixpence per foot.

42 Trees, averaged 1*s*. 6*d*. per foot	166	0	0
11 tons, 4 cwt. 2 qrs. and 18 lbs. of Bark, at £5 per ton	56	4	2½
	£222	4	2½

Bark Peelers had for stripping, fifteen-pence in the pound, on the sale price of timber only.

Fifty trees grubbed in Horse-pasture and Brideslawn, Spinny, produced one thousand eight hundred and seventy-two feet of timber; or thirty-seven loads, and twenty-two feet. These were thirty-six feet meetings.

50 Trees, valued at the above price,	141	8	0
8 tons, 17 cwt. 2 qrs. and 15 lbs. of Bark, at £5 per ton	44	9	1½
Tops and Lops,	9	0	0
	£194	17	1½

The Strippers had nine-pence per cwt. for peeling.

Six trees at Dodford, three hundred and forty-three feet; viz. fifty-seven feet meetings.

6 Trees, at 1*s*. 8*d*. per foot,	28	11	6
1 ton, 16 cwt. 1 qr. and 14 lbs of Bark,	9	1	3½
156 Saplings, Thinnings or Fliterans drawn out, sold for	13	5	0
2 tons 18 cwt, 2 qrs. and 2 lbs of Bark, at £5 per ton...	14	11	3½
	£65	9	1

These were the prices before the Junction Canal was opened. Strippers had for the fliteran bark, two shillings and sixpence in the pound, on the sale price of timber.

N. B. The fifty trees were from twenty to forty-eight feet long, and averaged at twenty-nine feet; and thirteen inches quarter girt, or four feet and four tenths multiplied by twenty-nine, gives one hundred and twenty-seven feet superficial surface of each tree; which produced three hundred and ninety-eight pounds of bark; or a fraction over three pounds per foot super, or ten pounds six tenths to each foot of timber. The Woodman earned three shillings and nine-pence per day; and when employed by the day, one shilling and four-pence.

To each load of timber in the above forty-two trees, were five and a quarter hundred-weight of bark. To each load in the above fifty trees, were four hundred-weight and six-tenths of bark; and to each load in the above six trees, were five hundred-weight and one-tenth of bark.

Trees of forty to sixty feet meetings, will produce five hundred-weight of bark, to a load of timber.

In the year 1808, I weeded out of Stanstead Forest, Sussex, three hundred apple-tree-headed Oaks, four and a quarter feet meetings, which gave thirty-eight loads of bark. The bark here is cut twenty-five inches long, and set on pole, sixty yards to a load. Twenty-six loads of timber here give nearly one and a half load of bark to a load of timber, which is one-third above the average, on account of their bushy tops.

In 1809, in the same Forest, three hundred and sixty-four trees gave twenty-eight loads of timber, and thirty-seven loads of bark, at three and a half feet meetings,

1810. Weeded out of wood, forty years' old, one thousand two hundred and six poles, of one and one-third foot meetings, gives forty-four loads;

Sold for..	245	0	0
61 loads and 25 yards of Fliteran or Pole Bark, at £3 per load....	184	5	0
Tops and Lop sold for 10 per cent on timber,...........	14	10	0
	£443	15	0

This was an extravagant price for bark. The tops were light, on account of being crowded.

Sixty grove Oaks, eighteen and a half feet meetings, is one thousand one hundred and five feet, or

22 loads and 5 feet, at Ten Pounds per load, ...	221	0	0
12 loads and 4 yards of bark, at four Guineas per load,	50	13	6
	£271	13	6

Here is almost two loads of timber stripped to one load of thin bark, owing to being light headed. In a crowded grove of one hundred and twenty years' growth, about seven of these loads that weighed eight hundred-weight, and thirty-seven pounds, would make a load of forty-five hundred weight, hatched, or twenty-eight guineas, in rough.

Seventeen other Oaks, six hundred and seventy-four feet, or twenty-eight feet meetings, are

9 loads, 26 feet, at £10 per load, ...	95	4	0
6 loads, and 16 yards of bark, at 84*s*.	26	6	4
175 Fagots, in lop, at 21*s*.	1	16	9
350 Bavins, at 10*s*. 6*d*.	1	16	0
	£125	3	1

1811. One hundred and seventeen trees, one thousand nine hundred and thirty-five feet, or sixteen feet meetings; thirty-eight loads, and thirty-five feet of timber, and only twenty-three loads of bark.

Eighty-three other Oaks, one thousand and fifty feet, or twelve feet meetings: sixteen loads of bark from twenty-one loads of timber, or six and a half hundred-weight of bark to a load of timber. Bark this year was, for timber bark, three pounds; and for fliteran, alias pole bark, only two pounds per load.

1812. Twenty trees, one hundred and six feet, or five feet meetings. Two loads of timber gave two loads and two yards of bark, at £2. 10*s*. this year.

1813. Twelve hundred and thirty-six trees gave four thousand five hundred and fifty feet, are under four feet meetings. Ninety-one loads of timber, and one hundred and thirteen loads of bark, at £2. 10*s*.

1814. One hundred and forty-three Oaks gave three thousand and seventy-seven feet, twenty-two feet meetings, or

61 loads and 27 feet, at 4*s*. per foot, ...	615	8	0
38 loads and 9 yards of bark, at £3. 3*s*.	120	3	6
1550 bavins at 10*s*.	7	15	0
This bark weighed 22lbs. per yard.	£743	6	6

One thousand and seventy-seven trees gave three thousand seven hundred feet, or three feet and a half meetings.

74 loads, sold at £4. 4*s*. per load, ...	315	14	0
177½ loads of bark, at £2. 10*s*.	443	15	0
1800 of pit-props, 7 feet long, and 3 inches diameter, at the top, at 1*d*. per foot, running measure; for Newcastle collieries, ...	52	10	0
2137 Fagots, at £1. 1*s*.	21	7	4½
1658 Bavins, 12*s*.	9	19	11¼
This last lot was thinnings of 34 acres, besides Beech Poles, that sold for	662	7	8½
£43 per acre, forty years' growth.	£1505	14	0¼

1815. Three thousand six hundred and fifty-three trees gave eight thousand one hundred and eighty-nine feet, two feet and a quarter meetings.

Sold by auction, for	428	6	6
235¼ loads of bark. at £2. 10*s*.	588	15	0
1200 fagots, at £1. 1*s*.	12	12	0
12000 bavins, at 12*s*.	72	0	0
	£1101	13	6

Thirty-three trees, four hundred and seventy-three feet, are nine loads, and twenty-three feet; twelve feet meetings. One tree in this lot, having had room, gave twenty-seven pounds of bark per yard, at the pole,

Timber sold for..	83	2	4
7 loads and 44 yards of bark, at £3.	23	4	0
Lop, sold in the gross, ...	4	4	0
	£110	10	4

Three hundred and thirty-four trees gave one thousand six hundred and fifty feet, thirty-three loads, nearly five feet meetings; being from twenty to forty feet long, fifty years old, and almost all heart,

Which sold for £4. 4*s*. per load, ...	138	12	0
24 loads and 12 yards of bark, at £2. 10*s*.	60	10	0
3 cords and 62 parts of wood, at £1. 1*s*.	3	16	1½
650 bavins, at 10*s*. 6*d*.	3	8	3
	£206	6	4½

This lot having grown in a Beech-Grove was nearly without tops, and some were dead-topped. The last lot of bark, when dried, weighed thirteen pounds per yard; which is a fraction short of twelve pounds of bark to a foot of timber. The whole weighed eight tons, and ten hundred weight; and when hatched, seven tons, two hundred weight, two quarters, and four pounds, worth eleven shillings and six-pence per hundred: expense of hatching, sixpence half-penny per hundred; and the scroff, or shavings to burn. Bark was then worth seventy-eight pounds seven shillings and six-pence. This proves that twenty-five hundred weight, in rough, will produce one ton, when hatched, of this quality.

Another lot of seven loads and forty-four yards, weighed seven thousand five hundred and forty pounds; and when carefully packed in a barn, measured twenty-eight cube yards; and when hatched, weighed five thousand and ninety-five pounds; so that this heavier bark of sixteen pounds to a yard, took twenty-nine hundred-weight and a half, to make a ton, when hatched. The tanner finds bags, and the vender pays carriage. If bark is properly dried, before it is housed or stacked, and kept twelve months, it will weigh out heavier, than it weighed in; and to know this, try if the bark be brittle, and breaks short over the knee. If it is housed whilst tough, it will get mouldy and spoil.

I housed sixty yards, in June, 1814, which weighed nine hundred and forty pounds; and in June, 1815, it weighed eight hundred and seventy-six pounds; loss in the stack, sixty-four pounds: and when it was hatched, it weighed seven hundred and eighty-nine pounds: loss, eighty-seven pounds: so that twenty-two hundred-weight and one quarter of this, gives a ton.

Another, sixty yards, which weighed, in the mow, seven hundred and sixty-two pounds; and in June after, it weighed seven hundred and fifty; loss, twelve pounds: when it was hatched, it weighed six hundred and fifty-one; loss, ninety-nine pounds; or twenty-three hundred-weight to a ton.

Another sixty yards, which weighed six hundred and forty pounds, in June, 1814; and in June, 1815, it weighed six hundred and eighty-seven pounds; gained forty-seven pounds; and lost in hatching fifty-seven pounds: so that less than twenty-two hundred-weight would produce a ton, when hatched. Each load of sixty yards on the pole, when packed in the mow, measured four cube yards.

One tree of fifty feet, produced fifty cube feet of bark, piled up green, and as close as possible. It weighed seven hundred pounds; and when dry, four hundred and seventy-six pounds; loss in drying, two hundred and twenty-four pounds:—this set forty-two yards, or six hundred and eighty pounds per load. Another tree of forty feet, gave six hundred pounds of bark, when green, and four hundred pounds, when dry.

Thirty-seven Oaks sold at one thousand and forty-four feet; and when hewed by the merchant, were one thousand four hundred and eighty-six feet, caliper measure; gained four hundred and forty-two feet.

1815. Green Oak Lop Fagots, four feet long and three feet round: one weighed fifty-six pounds. The weight of one hundred, stacked, and cubed twelve yards, would be two tons and a half; the value, one pound one shilling; fagotting, two shillings and six-pence; and three-pence for withs.

Oak Lop Bavins, the same size as fagots, but smaller wood. One hundred will weigh twenty-three hundred-weight, or twenty-six pounds a bavin. Making and withs, two shillings and nine-pence.

Peeling, barking, or tan-fluing begins, in Sussex, about the tenth of April; and in Midland Counties, about the twenty-third of April. The oldest trees should be taken first, as the season for them will be over by May-day, sometimes: but young trees will continue to run all May and June. Small knots and dead stumps give much trouble to the strippers: nor can the bark be got off at all in bad cold seasons:—hence the necessity of pruning, on account of the bark as well as timber.

Number of lots.	Number of trees.	Number of feet.	Meetings per tree, in feet.	Yards of bark.	Pounds of bark, per foot of timber.	Hard-wood, Notched fagots.	With fagots.
1	36	438	12	164	28	461	531
2	74	600	8	360	29	928	900
3	21	463	22	281	28	770	700
4	42	462	11	270	27	512	460
5	4	25	$6\frac{1}{4}$	14	26	....	75
6	6	130	22	53	19	212	200
		2118		1242		2883	2866

This Broke of Oak, was felled in Buckinghamshire, in the year 1817, where no art is used to keep the lengths or pipes of bark, open; nor is any set up, until the peeling is done: then edders, or small rods are set up, half a yard high, to receive the short bark; over which, is reared long bark, and capped with a line of the best, resembling the ridge of a house. This they term, "Double Set in Range."

2118 feet of timber at £16 per 100 feet or 2 loads...	338	17	7
1242 yards of Bark, at 2s 4d. per yard, and a yard high	144	18	0
2883 Hard-wood, or Notched Fagots, at 24s.	34	11	11
2866 with Fagots, at 18s.	25	15	10½
	£544	3	4½

Felling 2118 feet of timber, at 4s. per 100, ...	4	4	8½
Stripping 24 loads and 42 yards of bark, at 29s. ...	36	0	4
Paid to Strippers for loading bark, at 1s. per load, ...	1	4	10
2883 Notch-Fagots, at 3s.	4	6	6
2866 With do. at 3s.	4	6	1
1866 With do. cutting, at 4d.	0	9	6½
Total Expense,	£50	12	0

Sussex Strippers, at sixteen pounds per yard of bark, is, per ton, one pound eight shillings and ten-pence halfpenny; and their price of twelve shillings and four-pence three farthings, includes felling timber.

Buckinghamshire Bark Peelers, at forty-seven pounds per yard is, per ton, one pound seven shillings and eight-pence; and felling timber comes to three shillings and two-pence per ton on bark, which makes one pound ten shillings and ten-pence per ton; add for loading in wood, one shilling; suppose it drawn home, add two shillings for housing; the total expense per ton, will be one pound thirteen shillings and ten-pence. And as forty-five hundred weight is a London load, the cost will be three pounds fifteen shillings and a penny; and the expense of hatching a load of forty-five hundred weight, is one pound five shillings; amounting to five pounds and a penny.

In the Wilds of Sussex, their yard of bark in range, cut at two feet and one inch long, will weigh twenty-five pounds. Lord Sheffield gives his woodmen, for stripping, loading, housing, piling, hatching, weighing and bagging, four pounds fifteen shillings, for every load and part of a load, that he receives pay for, from the tanner; who finds bags: so that he has no trouble, farther than team-work. This is evidently the cheapest plan. It obviates all bickerings, as to setting up in range to dry; and gives the vender time to learn the state of markets. Bark was worth, in 1809 and 10, forty pounds a load; and in May and June, 1817, it was sixteen pounds; but as soon as the middlemen, or timber-dealers had housed their bark, they managed to get it up to twenty-six pounds, in July.

Buckinghamshire bark is cut at three feet lengths, and as to task-work, there seems to be no standard prices. One company of peelers, charged for felling trees, one shilling and sixpence, per load. Another company charged two shillings; and the gentleman's own woodwards charged two shillings and sixpence. They were exactly in the same ratio at fagotting; namely two shillings, two shillings and sixpence, and three shillings, per hundred. The bark was sold at eight-pence per yard, under time's price. The tanner being offered the bark next spring, bid two shillings per yard, and left: his neighbour, the timber merchant, goes and buys the timber and bark, at the last year's price; and the grower flattered himself, with having realized four-pence per yard, by not closing with the tanner, at two shillings. The bark was worth three shillings and six-pence per yard then; as the London price was thirty pounds per load.

BUCKINGHAMSHIRE. 1818.

Number of lots.	Number of trees.	Feet of timber.	Feet per tree, meetings.	Yards of bark.	Pounds of bark, per foot of timber.	Notched fagots.	Fagots.
1	59	799	13½	414	24	1260	811
2	70	645	9¼	338	24½	750	663
3	19	199	10½	107	25	204	186
4	32	481	15	229	22¼	874	326
5	22	368	16½	132	17	607	268
6	9	169	18½	88	24¼	278	122
7	9	389	43	149	18	773	327
8	8	188	23½	74	19	347	153
9	1	59	59	19	15	20	20
	229	3297		1550		5113	2876

	£	s.	d.
65 loads and 47 feet of Timber, at £8. per load, ...	527	11	0
1550 yards of Bark, at 2*s*. 4*d*.	180	16	8
5113 Notch, or Hardwood-Fagots, at 25*s*.	63	18	3
2876 With-Fagots, at 18*s*. per hundred, ...	25	17	8
	£798	3	7

In Mr. Farey's Derbyshire Report, page 321, is an account of a monstrous Oak, which was felled in the Park of Lord Scarsedale, at Kedlestine, in the year 1805. It contained five hundred and fifty feet of timber, and sold at five shillings and six-pence per foot.

	£	s.	d.
550 feet of Timber, at 5*s*. 6*d*. per foot, ...	151	5	0
9 tons of Bark, at £4. per ton, (green I suppose,)......	36	0	0
Top and Lop, ...	14	0	0
Roots, grubbed, ...	2	12	6
	£203	17	6

Suppose 300 of Fagots, at 20*s*.	3	0	0
11 cords of Wood, at 20*s*.	11	0	0

And as a cord of wood contains fifty feet of timber, then at a fair average of twenty-seven pounds of bark to a foot of common timber, and allow the head to be such, there would be six tons and a half of bark there. Again, suppose the bole of the tree to have been a cylinder of twenty feet long, whose contents were five hundred and fifty feet, divided by twenty, equal to twenty-seven and a half feet, for the area, whose circumference will be eighteen and a half feet, multiplied by twenty, equal to three hundred and seventy feet. The superficial surface of the cylinder, that is covered with two tons and a half of bark, viz. fifteen pounds to each superficial foot, or nearly ten and a half pounds of bark to each foot of timber.

				£.	s.	d.
Bark, sold in Derbyshire,	1807,	in the Rough, at per ton,		10	10	0
do.	do.	1808,	do.	17	17	0
do.	do.	1809,	do.	13	0	0
do. peeling in	do. 25s. per ton.					

By comparing the different modes and their results, the conclusion will be like the Lilliput's faith; consequently there will be big and little *endians*, to the end of time: and knowledge is of little use in business, without indefatigable application.

Woodwards and Stewards are more perplexed to ascertain the value of bark, every spring, than in any other department. The prices in southern counties, are governed generally, by the Bermondsey and other tanners; who meet at Leaden-hall Market: still it is evident, there is no combination, that can establish a national price, for one year.

By comparing dates and prices in pages 113 and 114, with the above; the general ruling criterion is peace or war, and imports from Flanders, Germany, Ireland, and America. Whenever there is any doubt, house and hatch at home; and if you have not convenient buildings, stack it, and cover with bark laid on tile, and slate form, until the tanner's stomach comes down; for it is there the secret lies in general.

Bark will increase in value, as it is obvious to superficial observers, that the growth decreases, and at the same time consumption increases.

I saw six stacks, each forty-five feet long, and fifteen feet broad, at Holme-House, in Herefordshire, the seat of the Dutchess Dowager of Norfolk, on the 22nd of August, 1816. Wool-staplers, and Wool-growers, have the same kind of litigation, annually.

MR. EVELYN'S thirty-third section is on timber measure: he cavils at the mode, without giving us a better: the custom is established, nor do I think it can be mended. The vender knows the custom, and makes his price accordingly.

In measuring Beech, no allowance is ever made for thickness of bark, nor for small Ash; but for large Ash, Elm, and Fir; what is under a foot square, half an inch is allowed, and an inch for all others. There is a small pocket volume on timber measure, with tables and plates of trees to all dimensions, by HOPPUS; which is very useful for beginners.

The girting string is about the thickness of whip-cord, with a noose or loop at one end, large enough to put the head into. The string being put round the girting place, the operator, with the left hand in the noose, draws the other end of the string as tight as possible, up to the knot of the loop; then lets go the loop end, holding the string by the girt place, drawing it from under the tree; then places the knot of the loop to the girt place, and doubles the string four-fold; his assistant holding the rule, he hangs one end of the folds upon the end of the rule, and measures off. Suppose the tree fifty inches round: by elasticity of the string, and what is lost in folding and hanging over the end of the rule, will produce no more than twelve inches, for what is called the girt. One foot of green timber thus measured, will weigh ninety pounds. The diameter of this tree, or of a circle thus measured, will be sixteen inches, and the side of a square equal thereto, will be fourteen inches and one-tenth, and their areas one hundred and ninety-nine inches. A circle, or a foot of round green timber, that is just forty-eight inches round, will weigh eighty pounds. A foot of green timber, die square, will weigh sixty-five pounds; and a foot of hewn, or what the timber merchant sells for square timber, will weigh only forty-seven pounds; and its area will be one hundred and four inches.* Corroborated thus:—

The area of one foot of timber, green and round, is one hundred and ninety-nine inches, and the weight, ninety pounds.

Then as 199 : 90 : : 144 : 65 lbs. or one foot square.

Then as 90 : 144 : : 65 : 104 inches, one foot hewn.

Then as 144 : 65 : : 104 : 47 lbs. the weight of do.

The greatest difficulties I ever experienced in measuring timber, have been to keep designing knaves, to proper dimensions; and from secreting the measure, by thumbing the folded line too much. The merchants' profits, seem enviable here: but, let it be recollected, the expense of carriage, converting, waste, and risks, added to the interest of purchase; nor do they sell it at as much per load, as they give for round. It is here they take the advantage of the unwary, who will ask ten pounds per load for his Oak; they reply, "That is more by two pounds, than they sell for;" and they must have some profit, or how are they to live?

A rich timber merchant once bantered me, in public company, with selling Beech at five pounds per load, and that he had just sold some in scantling, at four pounds ten shillings: I moved my hat, and thanked him, for his information; as I could now estimate their profits, by taking into account, that they bought fifty feet, of ninety pounds to the load, and sold forty feet of under fifty pounds to the load. I never, after this, was sneered at by timber

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*See Geometrical Square, at page 98, beginning of the Chapter.

merchants. Timber is slow in coming to maturity; and the grower should be slow in destroying it. He should fell a few every year, as the prices suit; also plant a few every year: and by so doing, he may learn to know better how to sell his timber, than to dispose of it at two pounds a load under its value; or as the late Duke of Bedford did with twenty acres of old druids: the particulars of which may be seen in the second volume of the Derbyshire Report, page 318. I shall conclude this long chapter with a description of a Wood-book and Timber-gin.

An Account of Timber felled in Gernil-Wood, 1824.

No.	*L.*	*G.*	*C.*	To whom sold, and the price per foot.	£.	*s.*	*d.*
1	30	12	30	Oak, sold John Doe, at 4*s*. per foot, ..	6	...	...
2	40	17	80	Ash, sold Richard Roe, at 3*s* do.......	12	...	...
3	50	17	100	Beech, sold Jack Noaks at 2*s*. 6*d*. do...	12	10	...
4	15	20	42				
	20	17	40	123 feet of Elm, sold Tom Stiles, at 3*s*	18	9	...
	20	15	31	Oak bark, yards, or weight.			
	10	12	10	Elm bark, at half do. price.			
		Cordwood.		*Fagots.*			

The first column is the number of trees; and when the tree is measured, the number should be marked on the butt with the timber-rase, or scrieve. Second column is the length of the tree. Third column is one quarter of the circumference, called the girt. Fourth column is the contents in feet, called meetings.

No. 1. 2. and 3. are the cheeks of the timber-gin, made of an Ash-pole, grown crooked, as per figure, at No. 12. with the root-end uppermost, fifteen feet long, and slit with the saw, from No. 1. to 5. At No. 5. is a bolt goes through, with a good head; a screw and nut at the other end, to keep the head from splitting; then the bars *a. b.* and *c.* are put in to keep it open. The bolt at 9. is a pivot to a pulley; and at 6. is another pulley. The hole under No. 2. is a hollow made to receive the head of the prypole. No. 7. is a roller or windlass, with two holes for

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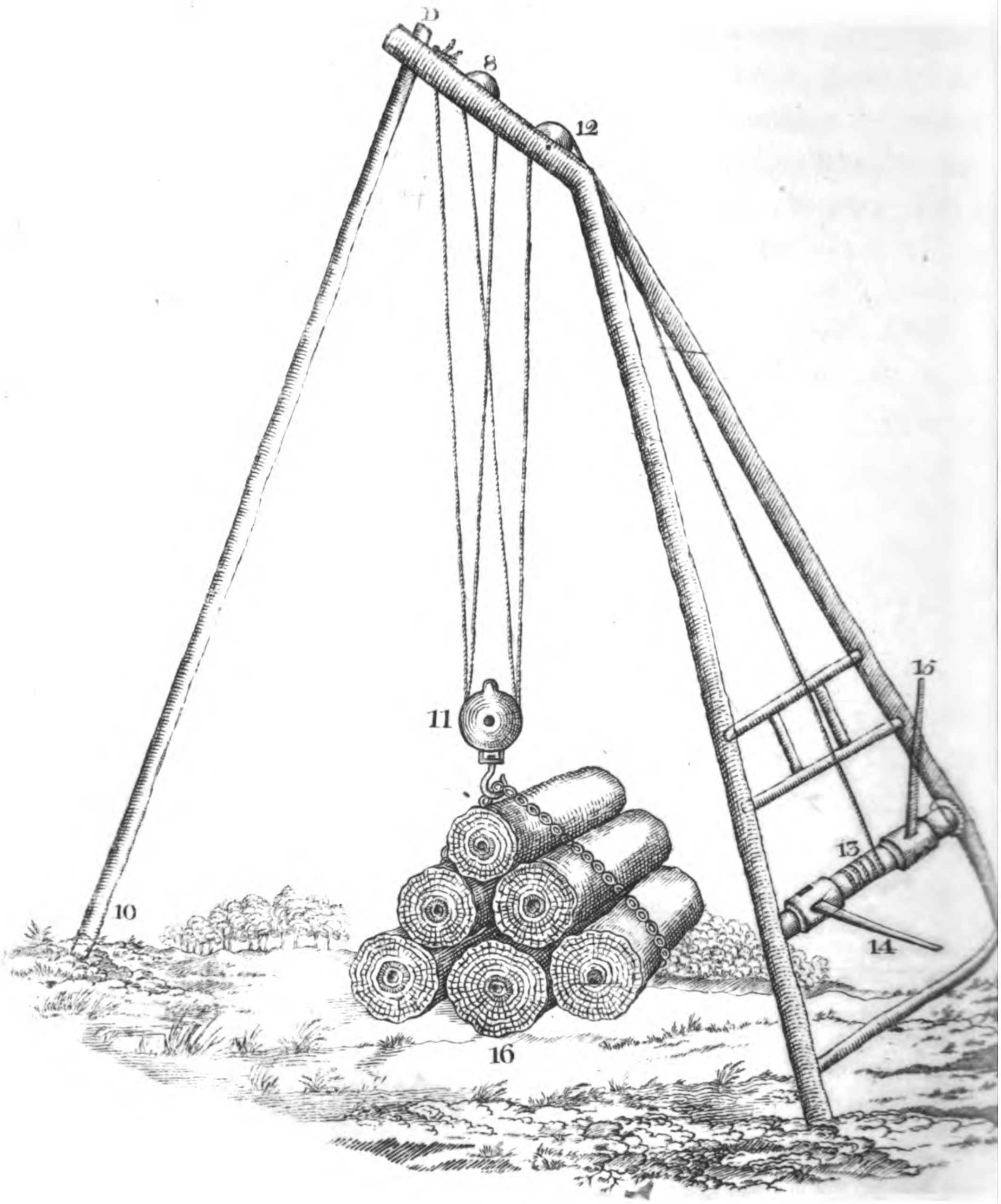
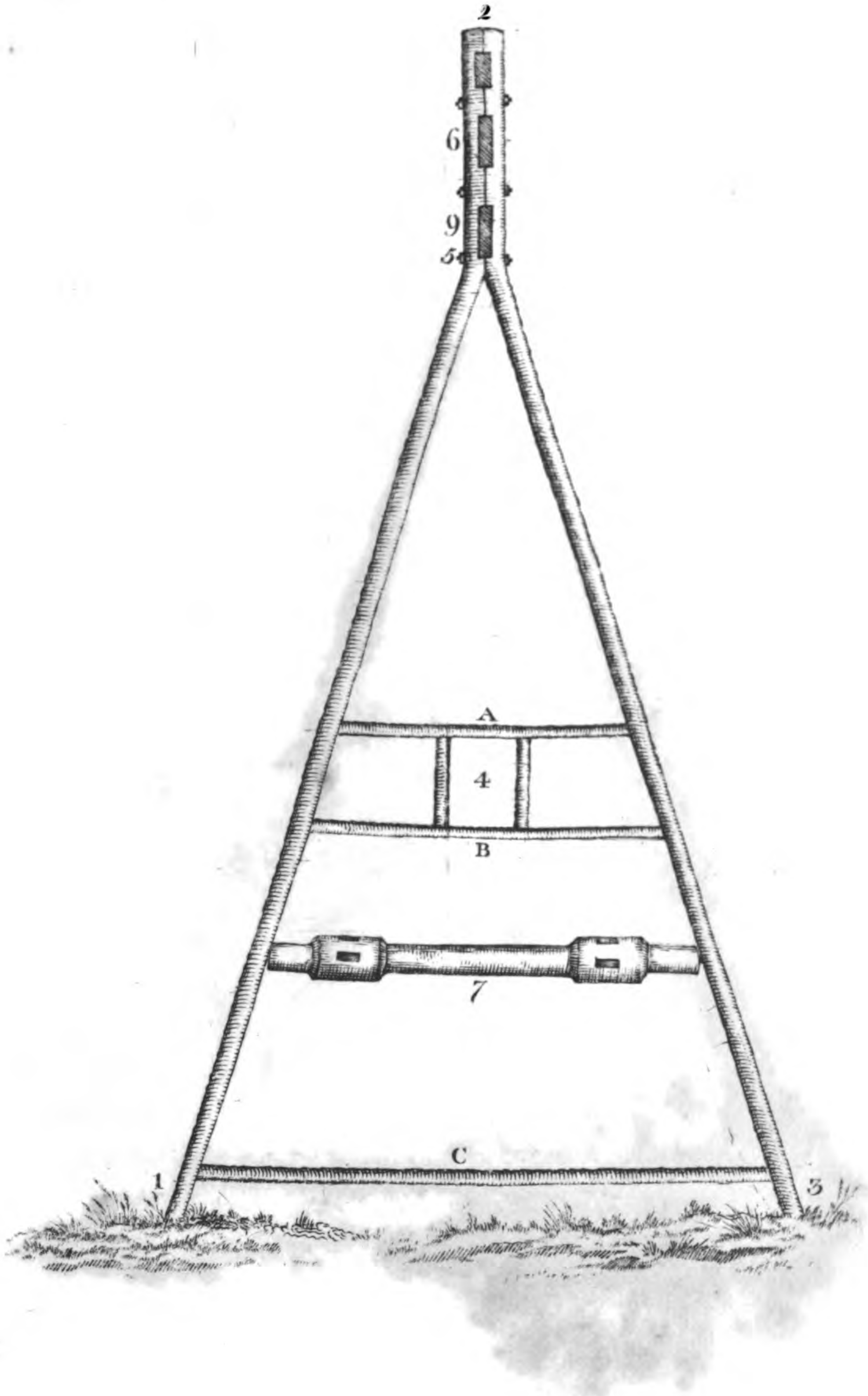



2
6
9
5
A
4
B
7
C
1
3

levers, and a racket-wheel at one end. No. 4. is the place where a man puts his head through; the two uprights resting upon his shoulders: he places it where convenient, holding it up until his mate puts up the prypole, No. 10. and 8. The gin is now complete, and six trees bound together with a chain. The block with hook and pulleys, are drawn down, and hooked on to the chain. The tackle-rope is tied to the gin at *d.* (by a strong swivel-ring) passed round the pulley at 11. and 8.; then through the block, No. 11.; thence to the pulley, No. 12.; and fastened to the windlass, 13. No. 14. and 15. are two levers, by which the two men raise the six trees, No. 16. with ease; even if they contained half a load of timber each. It is evident the bent neck from 12. to 8. will admit of a load being raised high enough for any carriage to be backed under.

CHAP. XXXI.

ON SEASONING TIMBER, &c.

1st. MR. EVELYN says, "Season timber by cutting through the sap to the heart, and so stand twelve months,"

2nd. Pile up in a dry, airy place, under cover. Your boards, planks, &c. raised on blocks, from the ground; with blocks between each scantling, to prevent mouldiness.

3rd. Some season by submerging in water, (running water is the best,) and afterwards set it on an end to dry, out of the sun, and frequently turn it. For ship-timber, it should lie two or three years under water. Elm, fresh cut and sawn, if thrown into water four or five days, will be fit for any use. Salt water is the best; it is not only a remedy against worms, but warping also. It is a good seasoning for Deal floor boards. Charing by fire, for sills and posts.

4th. On charing for other and general purposes.

5th. Boring large columns, to fill cracks in green timber, with fat skimmed from salt beef broth. Some use grease and sawdust.

6th. Cleft, better than sawn timber; but in neither to admit of any sap.

7th. Taring and sanding with a mixture of pitch, and scales of iron, or forge dust, thrown on with the sand; steeping in a solution of Alum.

8th. Of coating ends of beams with pitch, or sheathing them in sheet lead. I observed, in taking down an old bathing house, in 1797, that the ends of the Deal beams were sheathed in red lead. The beams were as sound as possible, and the lead or minium was as ductile, as if fresh laid on.

9th. 10*th.* and 11*th.* On clean and knotty timber, with observations on the grain.

12*th.* All very large timber must be very old, and like old men, past prime.

13*th.* 14*th.* and 15*th.* Of no moment.

16*th.* On Laths. The statute recognizes but two sorts: first, five feet laths, five score to the hundred: second, four feet laths, six score to the hundred: each sort one inch and a half broad, and half an inch thick. Heart of Oak-laths for tiling: Sap-laths for walls and plaster partitions: and Deal-laths for ceilings.

17*th.* On the comparative strength of timber, as tried by the Royal Society. Three scantlings of sixteen feet long, and three inches square, being one foot cube each, viz.

One of Fir,	weight 36½	lbs. broke with	specific	gravity,	as 2
One of Oak,	do. 59	do.		do.	as 2½
One of Ash,	do. 47¼	do.		do.	as 3¼

18*th.* to 26*th.* More curious than useful.

26*th.* By the statute of Edward, VI. the taleshide, or notched fagots were four feet long, number one, sixteen inches circumference, within a foot of the middle; if of two notches, twenty-three inches circumference; if of three notches, twenty-eight inches circumference; if of four notches, thirty-five inches circumference; if of five notches, thirty-eight inches circumference; and so on in proportion.

27th. Billets, three feet, four inches long: single, to be seventeen inches and a half in circumference: the double, or two in one length, or mark, to be ten inches in circumference; and of two cast, to be fourteen inches in circumference. With, or bound-fagots, three feet long, and two feet in circumference. This last statute of Queen Elizabeth, in the 43*rd* year, the size of billets was altered, and classed as round, of one, two, &c. N. B. Cleft of so many marks or notches, quarter-clefts, &c.

28th. On Fagots.

29th. On Charcoal. There are three sorts:—first, for iron-founders:—second, for gunpowder:—third, for London and the court, besides small-coal. Oak makes the best charcoal. Twelve stacks, of three feet wood, require a hearth of twenty-four feet diameter; twenty stacks, thirty-two feet; thirty stacks, forty feet; and so on in proportion. I shall not transcribe the process, as laid down from page 232 to 235, as it is an art by which many get their living; and by employing such, is cheaper than running any risk of not charing well, or burning the whole to ashes. It will be five or six days in charing, and require two or three days to become cool.

30th. Alder, peeled; or better Lime-trees, peeled, make the best gunpowder. Six stacks will make sixty sacks, or a wagon-load of coal.

31st. Small-coal, is made of Coppice-spray. Bavined, and being provided with plenty of water, they set fire to a few, and keep feeding, until five or six hundred is burnt; then they put out the fire with water, turning the coal, and watering it, until it be cool enough to sack.

R.

The first eight sections of this chapter, are on seasoning timber. Dr. Darwin says, "Saturate timber, or boards, in lime-water; and when dry, soak them again in a weak solution of the acid of vitriol, in water which will unite with the lime, already deposited in the pores of the timber; and convert it into gypsum, and it will last for many centuries, (mind the Doctor,) if kept dry." The ninth Volume of the Bath Societies' Papers, says, "The Americans cut the bark of their trees all round, three or four years before felling, to season it."—This they call ringing. Ellis, on Timber, says, "Boil staves for coopers' work." He says, "he saw, in Chatham Dock, in the year 1738, a sand-bath for steaming ship-planks; for which, a Captain Cumberland was allowed three hundred pounds a year, for life, as the inventor." It was laid aside, on account of the sand adhering so to the planks, that it spoiled the wrights' tools. He gives an account of a Beech-plank ground-floor, at Tring, in Herts, having lain sixty years; and was then sound. It was done by a lath-render, who could not afford to buy Oak. He soaked the boards a fortnight, in water: and then smoke-dried them in a chimney, a week. There was a cellar under the floor. (Then, how could it be a ground-floor?) He says, "Summer is the best time to fell Beech."—This is corroborated thus:—In 1810, Lord Selsey, of West-Dean, Sussex, had some old houses taken down; in which, was a Beech-beam that traversed two rooms. It was perfectly sound; and had on the angles, where scanty, patches of bark. When the beam was got out of the rubbish, it was discovered to have engraven on the top-side, with an inch-chisel, "*This tree was cut, 3rd May*, 1614." I cut some Beech-poles, for rails, in 1807, just as they were coming into leaf; and used them with the bark on, the same week. I visited them in 1819; they were then sound and hard, by the Keeper's Lodge, at Stanstead. Winter-felled Beech, suffered to lie three years, as it fell, is rendered useless for any purpose, but for fuel, and not so good for that, as if it had been broke up at first. I once felled some Beech, to accommodate a friend, just as it was coming into leaf. There happened to be one tree more than he wanted:—this laid in the grove, until the next winter; when there were more felled. Mr. Gravenor, an eminent boat-builder, came to buy some, from Flatt-Houses, near Portsmouth. I asked him, if he would have some which had been cut eight or nine months: he said, "It was not worth carriage." We went to the grove, and he marked on the bark, with his rase, such as he choosed. I then told him, that he had marked the old felled tree: he did not believe me, until I shewed him the butt-end: he was then surprised and pleased. I related the above fact of Lord Selsey's beam: when he replied, "The two circumstances had thrown such light upon the season for felling Beech, that he hoped to benefit by it; and, that he would take the tree in question, and have it used, where he could make future remarks upon it." I have been a little prolific on seasoning of timber, which is nothing more or less, than trying to prevent the decomposition of timber, by worm, or moisture, commonly called, dry-rot, which is a mistaken term; for, as Dr. Darwin says, "Keep it dry, and it will last for centuries."—So I say; and without his nostrums, provided it is well ripened timber, of Oak, or Spanish Chesnut, Deal and Yew; all other timbers, that grow in England, are inadmissible, as principles in buildings; except we can prove that spring felling will prevent the worm from getting into Elm and Beech. I knew a stable, that had Beech-beams, a foot square, for the hay-loft floor; and in sixteen years, they were so perforated by worms, as to break down with their own weight. As to Limes and Poplars, I have never known them used as building-timber. Any timber used green, i. e. before it is dry, and excluded from the air, by any means, rots directly, and is called, the dry-rot; at the same time, it is the confined sap that rots it; if confined by the smearing of pitch, tar, or paint. There is a well written sensible Treatise on the dry-rot, by Mr. Thomas Wade, published in 1815. He attributes much of the dry-rot, in ships, to boiling the planks; he wisely and honestly attributes the cause, and its effects to moisture, and the want of air in ships; and I am of the same opinion, with respect to houses. When we have a moist air, it is always observable, by condensing on windows, and flagged floors, vulgarly called sweating; but is never observed on bricks, nor wood, on account of their porosity. The wood-work in a house gets a bathing of this kind, perhaps fifty times in a year; and where good fires are not kept, it does not get dry, once in seven years. Bullocks' blood and whiting make good putty for cracks in posts out of doors. In the Transactions of the Society of Arts, Manufactures, and Commerce, volume the twenty-first, and pages 284 to 307, is much written on the dry-rot: the principle stress is laid upon the damp of the ground, and *Fungus, Boletus, Lachrymans.*

9th. 10th. 11th. and *12th.* Sections, are short remarks on timber, as to its being clean-grained, knotty, large, &c. As to grain, there are two distinct grains, in all timber;—the first is the annual grown grain, by the rings, or concentric circles, made by the annual increase of wood, between tree and bark, which, by lath-renders, is called felt-grain: and that is the grain, by which all Deal-laths are cleft:—the second grain is that which appears so beautifully radiated in a transverse section of the Hazel, running from the corona to the bark, called the parenchyma; and by carpenters, called the cleft-grain; by which, park-paling, and clap-boards for wainscot doors are cleft: hence those beautiful streaks in panels that are never observable in stiles of wainscot. If the same care were taken to cleave clean Oak, or saw it with the grain, it would be dappled like unto the panels: here is a real necessity for Oak, clear from knots. But the knottyest possible, as from the coarcture, or the crown, makes the handsomest tables and bouroes: as does knotty Mahogany.

16*th*. On laths. Thirty bundles of five feet, are a load; thirty-seven and a half of four feet; and fifty of three feet. Lath-rending, i. e. cleaving, is nine-pence per hundred; and for thatching laths, cut out of Coppice-wood poles, seven-pence per hundred, of Hazel, Ash, Withy, &c. About and in London, common Deal, or plaster-laths, are now used for plain tiling; and for pan-tiles, they are sawn out of Deal-planks, to an inch square; and for stone-slate, in Yorkshire, one inch and a half wide, and half an inch thick; so that forty-four lengths come out of a three-inches plank.

Oak-pales, rending and dressing. A length of an Oak-tree,

5 feet long, and 48 inches circumference, at 4*s*.	1	0	0
Rending and dressing eighty, at 3*s*. per hundred, ...	0	2	5
So that one hundred such is worth £1. 8*s*.	£1	2	5

Another length of five feet, and five feet eight inches in circumference, is

10 feet, at 4*s*.	2	0	0
Cleaving saping, and edging 130 at 3*s*. per 100, ...	0	3	11
So that one hundred of these were worth £1 13 10.	£2	3	11

There is more waste in cleaving Oak of seventeen, than of twelve inches girt; but the pales being broader will pale farther: one sort being four, and the other only three inches wide.

Cleaving bars for sheep and deer herdles, seven feet and four inches long, at three shillings and six-pence per hundred. Heads, braces, and uprights, for the middle, three shillings and sixpence.

6 of these bars, of 7 feet 4 inches in length, weighed, in rough, ...	44 lbs.
2 heads, $5\frac{1}{2}$ feet long, ...	24
2 braces, and 1 upright, ...	12
	80 lbs. 1 foot.

If green poles are worth two shillings per foot, then the timber for one herdle will be two shillings.

Timber for one herdle,	0	2	0
Cleaving,	0	0	5½
Making,	0	0	9
Nails,	0	0	2½
One herdle complete, weight, 40 lbs.	0	3	5
Allow the chips of 40 lbs. to be worth, (substract)	0	0	5
	£0	3	0
Deer herdles have seven bars, and heads, 6½ feet long,	0	3	6
Common sheep herdles, five bars, and heads 4½ do.	0	2	6

Oak pales, five feet, cleft from a butt of seventeen inches and a half, girt, are

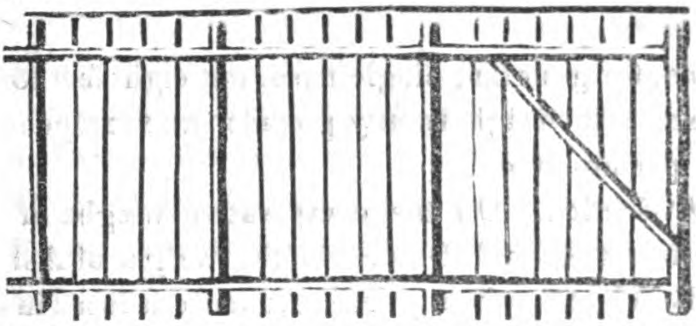
	£.	s.	d.
10½ feet, at 4s. per foot,	2	2	0
Produced 150 wide spiney pales, at 3s. cleaving,	0	4	6
	2	6	6
Value of 100.—£1 11 0. Value of 50,—£0 15 6.	2	6	6

Four Oak-butts, four feet long, and seven and a half inches girt, or

	£.	s.	d.
6 feet, at 3s. per foot,	0	18	0
Produced 150 pales, at 3s. for 120,	0	3	9
	1	1	9
Value of 120,—£0 17 4½. Value of 30,—£0 4 4½.	1	1	9

I suspect there was some foul play with the prime or large butts; or else very bad management. If I had any more to cleave, I would weigh both the pales and chips, the same day as the pales were cleft: about twenty-five pales to each loop, or panel, of eight feet and a half between the posts; and one inch and a half between each pale, for Park-pales.

Staves, four feet long, and an inch square, for Yorkshire gates. Cleaving, at three shillings per hundred and twenty; and twenty, in every hundred and twenty, to be two inches broad, and half an inch thick. Rails cleaving for the said gates, viz. the top and bottom bars, one penny per pair, split out of poles.



The heels, or burs of these gates, are cut out of the tops of Oak-trees, when fallen at the stripping season; and selected for their forks, as natural braces to the top-rail. They make the cheapest gates possible, for farms and woods; and when capped by a light fillet, through which, the three broad staves go through, and nailed on the head and heel, are rather ornamental.—Making, three shillings, and the wood, six shillings; amounting only to nine shillings per gate.

Cleaving ten feet spleets, or bars, for common five-barred gates, one half-penny each, out of poles; they are stronger than sawn-bars; besides, the saw-teeth are so expensive, as to cost as much as the wood is worth: these bars, in rough, will weigh from twenty to twenty-four pounds each.

Cleaving fence-rails, ten feet long, one penny per pair;—weight, twenty-five pounds each, viz. fifty pounds the pair. Fifty pairs, piled between stakes, will be four feet wide, and four high;—weight, two thousand five hundred pounds.

Cleaving uprights, (for a Scotch-fence,) five feet and a half long, one half-penny;—weight, ten pounds each.

30 of these, equal to 3 and one-third feet, at 1*s*. 6*d*.	0	5	0
16½ feet of the top-rail, equal to 1 foot, ...	0	1	6
Cleaving 30 uprights, for 1 rod of fence, ...	0	1	3
Putting up do. and cap, or top-rail, ...	0	1	6
Value per rod, ...	£0	9	3

This is no contemptible guard fence, for clumps of trees, against sheep and deer in Parks; and will stand many years.

Posts, for guarding single trees, cut eight feet long, and cleft, so as to weigh twenty pounds, at four-pence half-penny per hundred.

17th. Section. On the comparative weight of timber. There is not much difference in the weight of Ash, Elm, Oak, Beech, &c. when green; the more it loses in drying, the less durable it is. One foot of Oak, round measure, fresh felled, weighed eighty pounds. One of Beech, Ash, Elm, Walnut, Spanish Chesnut, and Yew-tree, each exactly forty-eight inches in circumference, weighed eighty pounds. One foot of Silver-Fir, exactly forty-eight inches in circumference, weighed fifty-eight pounds; and when reduced to die-square, it weighed thirty-four pounds and a half. Another foot, sufficiently large to cube twelve inches, weighed seventy-four pounds; and when cubed, it weighed only forty-four pounds: difference, thirty pounds.

Weight (in lbs.) of one cube foot of the following articles, all dry.

	lbs.		lbs.
1st. Lead,	708	*12th.* Beech,	53
2nd Iron,	477	*13th* Ash,	50
3rd. Marble,	169	*14th.* Maple,	47
4th. Stone,	156	*15th.* Wainscot,	46
5th. *Lignum Vitæ*,	83	*16th.* Yellow Deal,	41
6th. Green new felled Oak,	77½	*17th.* Cedar of Lebanon,	38
7th. Coal,	77	*18th.* Elm,	37½
8th. Mahogany,	66	*19th.* White Deal,	35
9th Box-wood,	64½	*20th.* Cork,	15
10th. Water,	62½	*21st.* Air, 1¼oz.	
11th. Oak,	57½		

A cylindrical foot of water, ... 50 lbs.

1st. Cordwood. A Beech-tree, of fifty-two feet, broke up into two feet billets; when piled, measured one hundred and sixty cube feet, which proves that forty-two feet, round measure, of large timber, billetted, will make one cord;—weight, thirty hundred-weight.

2nd. Beech Tops, small and straight, and cut four feet long, take five hundred and eleven feet to a cord;—weight, thirty-six and a half hundred-weight; one hundred and twenty-eight cube feet, as piled.

3rd. Old Beech Lop, corded, takes forty-five feet;—weight, thirty-four hundred. A cord of this wood being worth twenty-five shillings, proves, that timber is worth from six-pence to seven-pence per foot, to burn. Pit-props, for Northumberland, eight feet long, and four inches quarter-girt, take six inches of room, when piled in courses. Sixty-four make a cord. The price is one penny per foot, run—$64 \times 8 \div 12 = $ £2. 2*s*. 8*d*.

Park Pale Posts, at nine feet long, and six and a half quarter-girt, give twenty-six to a cord of nine feet long; and eight feet Posts, at five and a half inches quarter-girt, give thirty-eight Posts per cord, and are sixty-four feet, or just half a cord, which prove there is just as much space open as wood.

Park Pale Rails, ten feet long, and the weight, thirty pounds, take eighty feet to a cord, or thirty cube feet, round measure, at one shilling per foot, is better than cording, although three shillings and four-pence is to pay for cleaving. It will take forty-five, or fifty feet, to cut into cord-wood, which will cost two shillings and six-pence: and if cut into two feet billets, four shillings; no billet to be more than six inches broad: and if cut into eighteen inches billets, five shillings and six-pence; no billet to be more than four inches broad. Refuse of timber, in carpenters' yard, broke up into billets, of twenty inches long, and none to be more than six inches broad, is worth four shillings per cord, for cording; the cord will weigh thirty-two hundred-weight, and is sold by the hundred-weight, to the poor people, at one shilling and three-pence, in Dorsetshire, 1800. Grubbing, breaking, and cording tree roots, at six shillings per cord; and none of the roots left more than six inches wide, when the labour was two shillings per day: the stack then was worth twenty-one shillings.

Two White Poplars, felled;—contents, fifty-eight feet of timber, which produced seventy-five fagots. The roots were grubbed, and produced three stacks of roots, or twelve cube yards. A stack being $12 \times 3 \times 3 = 108$ feet.

Nine Spruce Firs, felled:—contents, two hundred and forty-nine feet of timber, two hundred and seventy-five fagots, and nineteen cube yards of roots.

Twenty-ninth Section, on Charcoal. A stack of Copsewood will weigh eighteen hundred-weight and a half, when fresh cut: and a cord will weigh twenty-one hundred-weight and a half:—this is called Collier's ware. So are roots, for what are called old-coal, worth eleven shillings per stack, and when made into charcoal, is sold to iron and brass-founders. A stack of Coppice-wood is worth twelve shillings, and a cord is worth fourteen shillings. A stack of wood will produce fifty bushels of charcoal, strike measure:—weight, rather more than ten pounds per bushel. A cord of one hundred and twenty-eight feet, will produce sixty bushels. What is called a dozen are twelve sacks of six bushels each, and two dozen, or one hundred and forty-four bushels a load:—weight, thirteen hundred: Dr. Watson. Dr. Hunter says, "That Lime-trees (when peeled) make the best charcoal for gunpowder; and Alder-trees the next best." When Alder-poles were large enough for rails and rafters, I paid for cutting, collecting, and peeling, one penny per pair. A man and his wife peeled forty pair per day. The bark is valuable for dyers,

100 lbs.	of	Walnut timber,	will produce	26 lbs.	of Charcoal.	
100	do.	Oak timber,	do.	24	do.	Dr. Watson.
100	do.	Box timber,	do.	21	do.	
100	do.	Mahogany timber,	do.	21	do.	
100	do.	Ash timber,	do.	18	do.	
100	do.	Fir timber,	do.	16	do.	

The above account proves, that to make charcoal upon a small scale, as per Dr. Watson, there is more loss than in the common way of pitting; as every hundred pounds of wood produce twenty-four pounds of charcoal: thus, two thousand and seventy-two pounds in a stack, give five hundred and five pounds of charcoal. The loss of weight in charing wood into coal, is much the same as drying grass into hay, losing from three-fourths to four-fifths. Expense of charing, per sack of five bushels, eight-pence. Value, per bushel, at the pit or hearth, eight-pence. Age of Oak; no specific period can be found, as its vigour depends upon the soil and situation. The symptoms of sickness, by dead branches, or bad colour of leaves, are the best guide, when to cut: for, from that time, the timber is wasting. Heart of Oak is free from sap, which is proved at the time of felling, as no sap then oozes out of it; but the sap oozes out of the blea, for a weeek or ten days after, in small quantities, seldom a quarter of a pint.

CHAP. XXXII.

APHORISMS; or certain General Precepts, of use to the preceding Chapters.

1*st.* BEECH, Box, Yew, Holly, and Hazel affect sandy, gritty, gravelly, and chalky soils. Oak, Ash, and Elms, for loams. Ash, Hornbeam, and Broad-leaved Elms, for stiff land: and in light, deep land, any sort will thrive: but in thin and rocky land, all the class of Firs do best, as their roots delight in being near the surface, the Silver-Fir excepted. In low and wet lands, Aquatics, particularly Alder and Birch, as they are always happy, wet or dry. Most of the Soft, or White-woods love to be where evaporation rises high.

2*nd.* Try all sorts of experiments to gain knowledge by weighing, measuring, and comparing notes. It is a rational and delightful amusement: but never be satisfied with the superficies, or by guessing. Wisdom is acquired only by patient perseverence in the business we profess; by which, we are sure to a moral certainty, to arrive to the head of our profession.

3rd. Elm has a radiated grain; but so very fine, that it is not to be seen without a good lens: hence its being so bad to cleave. Beech has a small, handsome, cleft grain, and makes good and cheap Park-pales; and so does Willow. Black-Poplar, Scotch-Fir, Stone-Pine, Pineaster-Fir, and the Thorn-Acacia are not inferior to Oak, or Spanish-Chesnut.

4th. Mulberry-trees bear pruning well. I knew one, at Breton Hall, Yorkshire, that spread sixty feet, and covered a wall, twenty feet high. In 1801, it was close pruned, and had thrown out vigorous young shoots, that were trained in between the old branches; and in the year 1803, they produced bushels of fine fruit, which was ripe on the 10th of August. Some of the berries measured $3\frac{5}{8}$ by $2\frac{3}{4}$ inches round.

5th. Slide-Rule. As some of my rural rustic brethren, that use the slide-rule, may not be arithmeticians sufficient to find the difference between round and square measure, it may be an amusement to know, that instead of twelve, for a centre, set the length on the slide to ten, and a little more than half, on the girt-line. Suppose fifteen feet the length, and seventeen inches the quarter-girt; the common way will give thirty feet: but, by setting fifteen to a little more than ten and a half, gives thirty-nine feet, the true content.

6th. Nature will not be cramped, or circumscribed in its vegetative progress; and I consider MR. EVELYN was pretty near right, when he allowed forty-five feet distance for Oaks; (of course he meant first-rate Oaks) and to leave trees at half that distance, on first-rate land, they, for want of room to form good and ample heads, would never swell the stems beyond the size of good plank logs. Daily observations corroborate this. Conic heads are the natural form of all young trees congregated, so long as there is a competition. Competition ceases in the very best situations, at about ninety feet; and then if they have not room to bring up their lateral branches from that time, there is a stagnation in the growth. It is the nature of all trees, of the Forest kind, to finish their growth with fine rounding tops, the Larch and Silver-Fir excepted.

7th. The last note is a strong presumptive proof, that leaves of trees are caterers; and, that the roots of trees send up nothing but pure water, which never goes back. As to the rising and falling of sap, is a mistaken notion, which I shall explain under the article, tree. Low, marshy, wet situations, always produce white wood, because the vapours of earth are watery. Elevated situations produce vapour, strongly impregnated with oily, sulphureous, and metalic matter, that give colour and substance to the timber. I knew a Walnut-tree, that stood in the middle of a farm-yard, (it was a cow-yard, and very wet,) which sold for fifty pounds; and it broke up so very coarse and white, that the purchaser told me, he should lose twenty pounds by it. Can this be attributed to any thing else but an absence of metalic food for the timber, through the bark and leaves?

8th. Dr. Rhees' Cyclopædia, says "Bark of trees is fed by air and atmospheric moisture; and that circulation of sap, is an effusion of sap from the heart of the tree, through the pores, which dilates the whole insensibly, by accumulating circle upon circle: thus, the annual gradations take place." This is analogous with my own ideas, which is corroborated by Ash growing near a pond or river. (I name Ash on account of its porous bark, and leaves imbibing more moisture than any other tree.) The lateral branches are less tapering here, than in any other situation; and very often the tops of shoots will be much thicker than the ground end: hence it is, that trees make what is termed false blea, as is frequently observed in Oak-tables. A streak of white running through the heart: this is caused by the month of June being very wet and warm, but so dense, that no metalic, oily gases arise to colour and harden the new blea. Of this second sap or ring, the first or inner one is always pale-coloured, being produced before the sun has power to raise the real food or pabulum of wood. It is such extraordinary seasons as this, which produce in quick growing trees, as Cedar of Lebanon, Dutch-Elm, Walnut and Spanish-Chesnut-trees, coltie timber; viz. the rings of wood made thus, are so large as to overgrow nature; and when a transverse section, or cross-cut is made, the interior, up to the said ring, seems liable to slip out; and when sawn or cleft, it separates as bad as shaken timber.

9th. I felled a Silver-Fir, in the year 1813, which was planted in 1684. I had twenty-eight feet cut from the butt; and I observed three of the concentric circles occupied no more room in the transverse-cut, than one of the ordinary, annual circles; viz., a quarter of an inch. This led to an idea, that some extraordinary season of summer lightning, or winter frost, must have been the cause. I found, by the knots, when broke up, that it was thirty-three years old, when twenty-eight feet high; and the innermost circle of the three was sixteen from the centre. There were seventy-one rings from the small circles to the bark. The three small circles added to seventy-one, give seventy-four; and seventy-four substracted from one thousand eight hundred and thirteen, will leave a remainder of one thousand seven hundred and thirty-nine. The Chronological Tables record a nine weeks' frost, of that date; and the fact proves, that it was three years after, before the Parenchyma was able to expend as usual.

10th. In the seventh Aphorism, I have denied any circulation of sap; for, if sap subsided into the earth every autumn. How could Cuttings taken off in winter grow? Willows, Poplars, Elm, and many other sorts, cut in winter, and there lay above the ground for months, and then planted in spring, will grow, even if planted with the small end downwards. I have seen a Gooseberry-tree thus reversed; and the roots produced a new head, and fruit the second year. I have frequently observed large Elms, after being felled and lopped close, produce shoots all along the uppermost side, the summer after; and sometimes the second summer shoot. Mr. Emeric, in his Culture of Forests, says "Any tree cut down after November, and disbranched; and afterwards lays until May, its bark will strip off as well as any fallen in April or May." These facts prove a non-circulation of sap. At the same time, they prove a powerful expansion, by the influence of the vernal sun; and the woodwards are equally sensible, what a powerful condenser a cold night is, by stopping their work of peeling.

11*th*. Mr. Evelyn says "Five inches are deep enough to plant in dry, light land; and one or two inches in clay and moist ground, provided you establish them against winds." I say, in clay or moist ground, plant an inch or two above the ground, by laying a clott under; then raise earth enough out of the interspaces, to establish them against winds, and thus you drain of the surface water.

12*th*. Light gases, inflammable air, or hydrogen, is allowed to be the principle food of vegetables. It is generated by the decomposition of animal and vegetable substances. In the summer months it is continually rising, and is inhaled through the pores on the surface of the leaves and young bark, as well as reticular net-work of old bark. It rises so strong sometimes in very hot weather, that I have met streams of it in large woods, which, for a moment, have almost caused a sensation of suffocation; and made the air to look as if tinged with red; which is vulgarly called red wind: hence our blasted trees, blights, and honey-daws, by stopping up the pores of tender bark and leaves; and at night, the caloric in plants, is condensed. The night dews, with the gases, settle upon, instead of entering into them; in the form of honey and mildew.

13*th*. July and August is the best time in all the year, for planting Yew, Holly, Box, and other Evergreens; or may begin at Midsummer. Various seasons have been fixed upon as best for planting Ever-greens. No soil or season is good when they have not been properly nursed in the nursery by frequent transplantings, until they are two or three feet high. And then no season is bad between September and April. It is proved, that the growth of trees is not from the earth, but by the expansion of the parenchymous sap; hence the cause of plants not swelling when crowded too close, encumbered with grass, or weeds, or otherwise excluded from the sun; which can only shine upon their tops, and draws them up tall and slender.

14*th*. Cuttings of trees, planted in October, are apt to rise in winter; they should be thrust down again in March: and all winter-planted trees should be set upright, and well fastened, after the vernal equinoctial gales are over.

15*th*. Seedling Beeches are so very succulent and tender at their first coming up, that they require protection from spring frosts by dry fern, straw, offal hay, &c.

16*th*. A first rate Oak, belonging to a gentleman of my acquaintance, in a midland county, having been felled, I examined the stool, and found a hollow in the centre, five by eight inches diameter; for which I allowed twenty years' growth.

4	Inches from centre,	for	20 years.
15	do.	for	40 do.
$0\frac{1}{2}$	do.	for	4 do.
10	do.	for	75 do.
$1\frac{1}{2}$	do.	for	11 do.
31	Inches, half the diameter,	at	150 years old.

The last eighty years' growth had been very uniform, and one-fifth larger on the south side, than any where else; so that it was five feet diameter from north to south, and only four from east to west. I flattered myself, whilst making these remarks, to have corroborated those of Silver-Fir, in the ninth aphorism, by substracting the eleven years of sap, and seventy-five, from one thousand eight hundred and thirteen. The same year the Fir was cut, it gave one thousand seven hundred and twenty-seven, instead of one thousand seven hundred and thirty-nine; so that the cause of those thin Laminas must be looked for in lightning, red winds, &c. N. B. The Silver-Fir had begun to decay. There was a hole in the centre of the stool, an inch and a half long, and half an inch wide. These throw some light upon the probable age a tree grows to, before decomposition takes place. I regret there having been no account taken of the weight of the bark, nor the lop and top; so I shall not trouble the reader with a measurement.

17*th*. There is an account handed down from MR. EVELYN'S time, by Dr. Hunter and other authors, of the top of a Vine-stem being cut off, and a glass-tube fixed thereto; and the sap rose therein thirty feet: but they make no comment thereon. I consider it as the water in a pump, which will rise, by the weight of the air, to thirty-two feet. The extraordinary rise of the sap, I consider, not from any latent heat from the earth, but the power of the atmospheric air, through the pores of the bark: also, that the air was the vehicle which collected and forced up the sap or water: and so it is by the bleeding of Birch, when tapped. I saw a Vine, in the year 1805, belonging to J. J. Angerstein Esq. of Woodlands, near Blackheath, Kent, that was, in the spring of the same year, cut from another Vine, and reduced to a single eye, not bigger than a horse-bean, commonly called a tick-bean: [illegible] planted in a garden-pot, of about one gallon me[illegible] placed in a pine stove. The same season it produced a shoot, thirty-seven feet long, and an inch and a half round; upon which were two bunches of grapes, not much short of a pound each. All this could not be produced by water from the roots; but principally from the steam raised from the bricks, and mortar of flues, heated and watered for the purpose of forcing Pines and Vines: and thus is vegetation carried on out of doors, in summer months. I believe it is in a minor degree only, by the sun causing an expansion of parenchymous matter of plants, which are fed and matured by evaporation. *(See Hales' Vegetable Statics.)*

18*th*. Much has been said about an Arbeel shooting up seventeen feet in one season, at Sion-House, near Brentford, in Middlesex. I know of no soil or climate in this Island, more likely to push vegetation: it is a deep, sandy silt, on the banks of the River Thames, and well sheltered. Let it be remembered, it was a single shoot, from a plant, cut down; and we know that our hedges and coppices shoot up as high the summer after cutting, as they will in three or four afterwards. I have seen Ash shoots pushed up eight feet from the stool, after copsing, in one season. The general average of the leading shoot of an Arbeel, annually, in Southern Counties, is about three feet and a half; in the Midland Counties, three feet; and in Yorkshire, two feet and a half. A tree cut down, never spends its sap through the surface pores of the horizontal surface of the cut; nor do the new shoots arise from the roots of old stool, but from the parenchyma, that radiates from the centre to the bark, and grows there, just as a bud or graft, enjoying the whole power of the sap's expansion: hence their frequent failure in woods, by winds blowing them off.

19*th*. Hide-Bound-Trees. MR. PONTEY says, "They require large heads." He has got a train of reasoning upon the action of sap in trees that I do not understand. I have always found, that the best remedy for a Hide-bound-tree, is, to reduce the head just as he recommends for dead topped trees; and scarify the bark, not only at intervals of half a yard, but half a palm; in short, as much as you please; but do not cut through the bark. The timber-rase is the best tool for scarifying.

20*th*. *Cicatrice*, Pit, or Scar, by bruise or amputation, when healed over, are always looked upon with a jealous eye, by timber dealers, who call them owls' faces, and fluted hollows in trees. MR. PONTEY calls them furrows or troughs. He thinks they are caused by the current of sap being obstructed, by the stumps of branches being left on; and paralyzes his ideas by referring his readers to a plashed hedge. He says, "By this operation the whole of the plant is made to lie in a sloping direction, often nearly flat, in consequence of a deep cut which separates almost the whole of the wood, and more than half the bark; yet, such plants are found not only to grow, but thrive afterwards." Now, I think this the strongest proof against his current of sap he possibly could have advanced: for, if the cause of wanes, furrows, flutes, or troughs were from stumps of shoots, or from wounds; then such plashers being fed by a current of sap, through such a slender portion of wood and bark on the under-side, must cause a fillet or rib to grow there; and the upper-side of the said plashers must perish in course, which never happens. I consider such plashers are placed exactly in the situation of buds and grafts: for, were there a possibility of this fluctuating intercourse of sap, between the roots and branches of trees, it would be of no use to graft or bud; the fruit would be supported by the stock, and of course the fruit partake of its sap: nor do the stock ever receive any change from the imp imposed upon it, by the mistaken idea of a descent of sap; if it did, I think the Purple-Beech would prove it, as I have observed the wood of Purple-Beech clouded with purple, but never the stock it was worked upon.

21*st*. In page 174, MR. PONTEY says "That the quantity of branches may be such as nearly, if not absolutely, to prevent the stems increasing in circumference." On that head, the following experiments are submitted:—In the spring of 1803, a Poplar was disbranched, and its head taken off, about fourteen feet from the ground, but no notice taken of the girth. That summer it produced a large quantity of shoots from every part of the trunk. In the following winter they were cut off, and the girt was taken, which was twenty-five inches. In the following season it produced much the same quantity of shoots, as in the former, but did not increase in thickness. All the shoots being again taken off, the produce of new ones proved much the same as in the two preceding. The girt was taken in October, and was short of half an inch increase, which was evidently the effect of scarifying. Another Poplar, twenty-six inches girt, with its head and all its branches being left on, swelled in the course of the summer three inches and a half: this proves MR. PONTEY'S inference of a large headed tree being incapable of swelling the stem, to be incorrect, as his dismantled Poplar could not swell for want of caterers; therefore his conclusion is incorrect also. The Oak described at Sheffield-Place, corroborates this idea; and, as a further elucidation, I give two other Oaks: one was planted by an acorn, in the garden of Denham Rectory, Bucks, in 1750. I measured it in 1817, its dimensions were as follow:—total height, fifty feet; diameter of head, seventy feet; circumference of stem, at the smallest part, eight feet. Surely these instances prove leaves and branches to be caterers. At Southgate, in Middlesex, is an Oak, whose head is composed of forty-five limbs, each no contemptible tree, if taken individually. Its diameter was, in 1812, one hundred and fourteen feet: now, 1824, it is one hundred and twenty-six feet diameter, seventy feet high, the bole ten feet high, and fifteen feet two inches in circumference, in the smallest part. *(See page 107.)* Total height, eighty feet, and the head, a perfect half-globe.

22nd. I have already shewn that a cube foot of green Oak will weigh sixty-four pounds; and if round measure, of exactly forty-eight inches circumference, it will weigh eighty pounds; but by the timber merchants' dexterity in stretching an elastic girting string, and their artful way of thumbing the folded string, it requires fifty inches in circumference, to produce twelve on the rule: such a foot of round timber will weigh ninety pounds: so that the buyer gets one load in nine, for his officious kindness in measuring for himself; but the iniquity does not stop here, they take every advantage in measuring the lengths, by stopping at improper places, and beginning again too high up. The Duke of Richmond was so sensible of this, that he had a Steel-yard, with chains suspended in the Park to a beam upon frame-work, to which was fixed a ladder, to get upon a stage to adjust the weights, when weighing a load of timber or bark. It is high time that timber-growers, or their agents should undertake to measure for themselves, like all other dealers; and not suffer the buyers to get behind the counter, to weigh or measure for themselves. It was always my plan, and I never found any difficulty in selling, or obtaining the best prices, to the amount of two thousand a year, for seven years. A few years back, I was invited by a gentleman, to transact some business for him. He had sold his timber standing, at per load, to be measured after it was felled and stripped. I was requested to go with the bailiff and the purchaser to see it measured. We frequently differed in our opinions, as to taking the dimensions. Having got within a few trees of finishing, and at the best tree in the broke, the merchant's attempt at imposition was so gross, that I told the bailiff to take the book and finish the job, as I could not submit to be witness to such measuring. I reported progress, and heard no more of the subject. Next spring I was called in again, and on my arrival, I was informed by the bailiff, that the timber merchant had been indulged with the choice of his own measurer. The bailiff and I measured it privately. The trees were all scrieve rased, with the contents, such as they were. I sounded the gentleman, when by one of the trees in our road, by telling him, that I had measured that tree, and found many feet of timber more than were marked. He replied, "I did not tell you to measure it," in a tone of voice, more appaling, than if he had answered hastily, "Let it alone." When I had finished my business, I retired quietly: nor have I ever set my foot upon the premises since. The deficiency in measure was just six per cent, or fifty-four pounds twelve shillings. This paralyzes what is related in a preceding chapter, how the late Duke of Bedford overlooked his own agent, to dispose of twenty acres of old druid Oaks, at little, if any more than the value of tops, lop, and bark.

23*rd.* I have quoted much from Mr. Pontey's Work, because he has so many accute ideas; but badly arranged: consequently, the reviewers very justly observe, "That it is a dangerous work, in the hands of novices." I think, if he had published it genuine, without the assistance of the Rev. James West, to revise and correct; his work would have been more valuable: as Mr. West has, in order to display his learning, and make the book read well, rendered many of his accute ideas exceedingly obtuse, by sophisticating some parts. He has palliated, puzzled, and confused others, by telling them, "That knife-pruning is sufficient to train up a tree to the height required:" and in another place, "That the prunings and bark therefrom are to cover the expense." What bark is to be expected from knife-prunings? "Cut wood, and have wood," he says, is the gardener's adage. And so far the gardener is right, when he wants vigorous young wood in his trees for fruit; but here we want to swell the stem, and that cannot be done without a proportionable head, grown many years beyond the power of knife-pruning. *N. B.*

1*st*. Plantations rise in a mas, and shelter each other. Page 75. (Good.)

2*nd*. Shelter of hedge-row timber prevents grain filling; produces mildew, and is worthy of the character of the times: which he knows was extreme ignorance. Page 134,—5.

3*rd*. In his first lecture, page 75, he allows, that the trees shelter the plantation; if I read right: if not, it must be, the plantation shelters the trees. But in page 189, he wants underwood for shelter.

4*th*. To obtain shelter, we are to chop off the heads of some. Page 203. Again, in page 205, he sends any common labourer into the plantation to chop down the head of every fifth plant. (Comment upon his boasted nature and reason.)

5*th*. To keep woods sheltered, the underwood is only to be partially cut. Page 252. (Confusion all.)

6*th*. In his profitable planter, page 80, he decapitates the poor Spruce Fir for shelter, in screen plantations. I suppose he means Belts. The Spruce Fir is the best in his list, only let it keep its head and give it room.

7*th*. Shelter promotes the growth of grass earlier, and continues later. Corn will be earlier, and better ripened. Page 93. Compare this with my second remark above, and you will say "*fudge*;" or, "that the Rev. Gentleman had forgot his text."

ANOTHER SERMON. In the 20th volume of the Transactions of the Society of Arts, Manufactures, and Commerce; in the 7th chapter, and page 80. You will find these words at the end of 84th page; "Tap Root." For which they voted their silver medal to the Rev, R. Yates, Chaplain to Chelsea Hospital. He boasts of fifty years practice. He limits the Oak to time; (and Mr. Pontey has limited it to space.) "The surface roots, he says, are of little use besides steadying the tree in the ground. It is the tap-root that is the essential principle, never to transplant, but sow the acorns in rows, thirty feet apart; the places to be prepared three feet square, and from three to six feet deep. The plants to be annually pruned, until they have got a clear stem of from forty to sixty feet high, and then suffered to run to head." Thus in fifty years, he professes to get larger and better, than can be got the common way, in a hundred years. When the committee awarded their medal for this, they committed themselves. The impolicy of his Pits, will be seen under the head Plantation. And as to pruning, he has gone twenty feet higher, than any rational man would attempt; or find practicable against a Waver sixty feet high, with a head or top no more than two or three years old. A comparison of a parabolic spindle, in miniature, would be a butcher's skewer, pointed at both ends, and stuck half its length into the ground, to represent Mr. Yates' tree.

"How much to heaven, her tow'ring head ascends,
"So much to'ards hell, her piercing root extends." *(Evelyn.)*

24*th* Aphorism. Mr. Evelyn gives a few technical terms for various parts of a tree. Botany was then in a state of infancy. Sexual system and parts of fructification were first invented by Sir Thomas Millington; then improved by Dr. Grew. After him, Mr. Moreland; then Mr. Bradley, and finally established by Sir Charles Linnæus. His arrangements are,

1*st*. Calyx, is from Epedermis. Skin or outer Bark. Cup.

2*nd*. Corolla, or Flower Petals, is from inner bark.

3*rd*. Stamina, or Chives. Anthera contains Pollen, or Dust Male.

4*th*. Pistil, Style or Stigma. This is female part.

5*th*. Pericarpium, or Seed Vessel, alias Germin. They are various, as in Apples, Berries, Nuts, Pods, &c.

6*th*. Semina. Seeds: as acorns, plums, pease, &c.

7*th*. Receptacle, or bace of the whole; as the white knob that is left after the downy seed is fallen, from the Dandylion and Thistle.

As I have never met with any regular description of a tree, in any author's works; I will endeavour to analyze the Oak.

Quercus Robur, belongs to class twenty-first, or order *Polyandria*. I scarcely know where to begin my anatomy. To begin at the top, is unnatural; and to begin at the roots, will not admit of a proper distinction between radicle and plume; or roots and branches. So I shall begin at the level of the surface of the ground.

1*st*. Coarcture, where vegetation first takes place, and salts most abound; and what is by woodmen called kerf, or off-cut place.

2*nd*. What is left in the ground after the tree is felled, is called the stool or butt-root.

3*rd*. Butt, roots, or laterals.

4*th*. Butt-end of a tree, when felled, shews epidermis skin, or the thickness of outer bark.

5*th*. Parenchyma, or middle bark; alias, cortical body.

6*th*. *Liber*, *Cortical*, *Cortex*; or inner bark.

7*th*. *Alburnum*, blea, fat, or sap.

8*th*. *Tracæ*, or heart.

9*th*. Corona, or back-bone; alias, core, an inch thick generally.

10*th*. *Matrix*, pith, or marrow.

11*th*. Parenchymous annual circles.

12*th*. *Lignous*, *Fibrina*, or woody towy, do.

The two last form felt-grain

13*th*. Parenchymous.

14*th*. *Lignous*.

The two last form the cleft-grain, and are beautifully radiated from the corona to the bark.

The four last are to be seen in old Oak-stools, not unlike Mosaick pavement, in small die squares, by the Parenchymous grain decomposing first, and leaves the *Lignous.*

15*th.* *Scapus,* bole, stem, shank, or trunk. When it has a forked head, and that cut off.

16*th.* Crown on the top of the trunk, from which.

17*th.* Ramifies, limbs, branches, or boughs of the head. But if there is no crown, as in Firs, it is a tree without head, but has a top and lateral branches.

18*th.* *Frondes,* or leaves. Thompson says, "They are covered with the epidermis," which I doubt. They are annuals, so are deer's horns, which fall off in spring, and the leaves fall off in autumn. The horns as well as leaves will break in any place; but at coarcture, or the place from whence they grow, the leaves answer three purposes, viz. ornament, a protection to buds, and caterers of pabulum of aerial food.

19*th.* *Capitulums,* or top buds and flowers.

20*th.* Empalement, *Calyx,* or cup, is from epidermis. (Doubt.)

21*st.* *Floral Petals,* or flower leaves, is from the parenchyma, or middle bark. (This I also doubt.)

22*nd.* Attire, thrum, or summits, or male pollen, is produced from inner bark, or *Liber.* (Doubtful.)

I have doubted on the 18*th*, 20*th*, 21*st*, and 22*nd*, divisions, because I consider every part of a tree to be in the parenchyma, produced from the corona, and wove into flowers, fruit, &c. in nature's loom; and not any extension of the last year's wood or bark; as all flower and fruit stems are annuals. They have their coarctures, articulations, or joints, as deer's horns and leaves; and as such, when ripe, they drop off.

23*rd.* *Thecæ,* or the seed-case of pease, is the male part, when in bloom.

24*th.* Receptacle, or echinated cup of acorn, is from parenchymous wood.

25*th*. *Lobes*, or parenchymous glands of acorn, is from the corona.—*Arbor*, or tree complete, although it may not be scientifically arranged in the floral part.

26*th*. *Nectari*, or honey cup, is from sap or vascular ceries.

25*th* Aphorism, on Vegetation, beginning with seeds. Dr. Grew's definition of a Bean:

1*st*. *Corculum*, or speck of life.

2*nd*. *Plumula*, or scaly part of the said speck, called the eye.

3*rd*. *Cotilladons*, lobes, or glands, is the edible part. Parenchymous.

4*th*. *Hillum*, or external mark, whereby it grew.

5*th*. The *Arillus*, or external coat, alias skin.

5*th*. Epidermis, or skin, is the inner coat of the seed lobes; and extends to the radicle. It is a most delicate transparent membrane.

7*th*. Radicle, or root, unites the two lobes of acorn together; and in malting of barley, is called Come, or Combs.

8*th*. Plume, is situate upon the basis of the radicle, and is the true coarcture, or point of contact, between root and branch. Its situation is between the two lobes of acorn, and ultimately becomes the tree. In malting of barley, it is called blade, or acrospire: but in acorn, its leaves expand like a plume of delicate small feathers; hence, its being called Plume.

9*th*. Corona, or Circle of Propagation; first named by the immortal John Hill, M. D. in 1770. It is a delicate brown string, that runs through the centre of the radicle and plume; it branches into the two lobes: it is the matrix and core, or pith and backbone: it terminates at Corculum, or eye, and conducts the moisture to the parenchyma of the lobes. When the vernal sun warms to a proper degree, fermentation takes place; in course, expansion: the radicle being most at liberty, is pushed out by the expansive energy caused by fermentation, in the form of a small watery bladder; so soft that it cannot rise. For if the seed is placed the wrong end upwards, the radicle will creep round; or more properly be pushed forward, until it meets with something else to interrupt its progress, or it dies. But if in the ground, as soon as it is fairly enveloped in the earth, its expansion is interrupted, and then in its turn, it assists the Cotilladons to push up the Plume and Germe. During the watery fusion and fermentation in the seed lobes, all the parts of the plant are formed as regular as the bird in the egg, whilst the hen sits thereon; and the act of expansion may be paralyzed with that of hatching: every part being softened so much during fermentation, as to be sufficiently elastic, to stretch out and keep pace with the expansive growing nature of the whole plant, by day; and gathers fresh matter of food through the pores of the skin, by absorption, in the night. During the absence of the sun, condensation takes place, which makes room for the aerial food to enter; on the return of the sun, the whole mass is put into motion again; the new food is concocted and assimilated to it alternately, night and day; during the growing season, identified in the form of viscous mucilage, and formed into tubes, and threads, by the air or gas, ascending and descending, like steam in a cylinder expanding and condensing. The fact is:—it is one, and the bark is the cylinder; in the centre of which, is the corona, from which emanates the lateral radi, or cleft grain of wood. Parenchymous matter of wood is an acid; spiritious and sour as in fruit and young shoots. The lignous, woody or towy fibre, forms the other part of the wood, and is dawn out of the parenchymous mucilage, into capillary tubes, threads, fibre, grain, &c. Also vertical, horizontal, rectilineal, and spiral forms, as above stated, by rarifaction and condensation. This anatomical analysis, shews there are but two permanent, or organical parts of wood: viz. parenchymous, and lignous; (this is charcoal, when the first is burnt out of it.) The acorn having become a plant, of a year old; examine it: it is but the seed enlarged: and dame nature has the same chemical process to go through, in her laboratory with the plant, as she had last year with the seed. The watery fusion commences in March, and a gentle fermentation takes place in the parenchyma, that lubricates all the towy parts of lignous substances, and saturates the sap vessels; as the warmth increases, the power of expansion increases. In April, the gases, oils, salts, water, &c., have got so intimately mixed, that fermentation is at its height. This is the end of what is called the bleeding season. From this time, the sap begins to stiffen into a jelly, more capable of expansion, than before; the effect is seen by the opening of the buds. This is the time to strip the bark off Oaks.

It is a vulgar, although general received opinion, that the sap subsides in winter, and that the earth is so good as to return it in spring. The fact is, as by seed radicle, the first motion of sap is downwards, into the roots; the winter having softened the ground, it admits of the tender roots extending a little farther. Then shoots are pushed up by the gas. It is very curious to observe how the bark on young shoots extends, particularly the Pine tribe; the progress is now exactly the same as last year, from acorn, as above stated; excepting the parenchyma of lobes: they perished. The parenchyma of the tree increases, but not until the shoots are made, and the leaves fully expanded; then the tree begins to swell. The sun getting more powerful, causes the parenchyma to expand from the corona to the bark, a little daily, and fed by night as far as the expansive power will admit of. The lignous fibre, and sap vessels being formed by the dilating and condensing power of mucilage; as above. This process is complete about the first of June: and by midsummer, the tree abounds so with sap, that a second shoot is made, and another horizontal expansion of parenchyma; which produces another ring: hence the two annual rings of wood; the first is parenchymous, and light coloured: the last is more lignous, and darker coloured; by reason of the earth being drier, and the sun more powerful, raises oxyds and oily gases, in vapour, which enter the plants with the air and dews by night. Thus does nature pursue her work of vegetation in trees annually. It has been said, "that trees grow by elongation of cortical, parenchymous and lignous bodies; and that the swell or thickening of trees, is by their roots, from the earth." My opinion is already explained by the vegetation of acorn; and its second years' growth, so far as regards the swelling, expanding, or thickening of the tree: and with regard to the annual shoots, I believe them to rise entirely from the pith and corona, or ring of propagation; as explained by Dr. Hill, in his valuable work, with plates. All young shoots are at first herbaceous, and exceedingly tender; formed and fed of and by a glutinous substance generated in the corona and parenchyma, and pushed up by the expansive power of gas or sap, independent I believe, of any elongation of former parts of bark or wood; and that the aerial gases colour and mature the skin and leaves. The fibres, or grain of wood, is not formed in this young shoot; it is parenchymous, and ultimately becomes the corona; and is exactly of the same nature, substance, and taste of young fruit of the same tree; just as the bloom falls therefrom. The gases soon sour the fruit; but as they get colour, transparency and consistency, they get sweet as red currants and cherries; white currants, and white grapes; apples, pears, &c.

Tastes or flavours, odours as well as colours, are governed by their sulphureous and oily contents; be they sweet or fetid. Smells are drove out by caloric, alias latent heat, caused by light, or warmth of sun; or friction, as perspiration, and may be called effluvia of radical moisture, by rarifaction to a considerable distance; this we know by our alfactory nerves. The first in spring, is the Juliferous tribe of catkins of sallow, or saugh goslins, alias palm. Next is, bloom of fruit trees, aromatic herbs, &c.; the seat of which varies: some is in the dried root, as avons: some in the bark, as cinnamon: others in the leaves, and bloom. Sweet-Dock, alias *Bistort Polygonum*, when in bloom, smells exactly like———— (Smell at it.)

Some are sanative, healing, diaphoretic, causing perspiration, vomitory, purgative, hot, fiery, bitter, sweet, cool. Houseleek and poisonous plants; who dare risk his veracity, by undertaking to prove, that the food of plants enters at their roots, out of the ground?

Dr. Watson, in his Chemical Essays, says, "One small box of earth will produce four thousand different plants, from or in twenty pounds of earth; and in each plant will be found a different oil and salt." If these oils and salts came out of the earth, there must have been four thousand of them in twenty pounds of earth. The fact is, there was not a single grain of either oil or salt in it.

Again. Dr. Watson planted a Willow, of five pounds weight, in earth that was weighed; and in five years the Willow had increased one hundred and sixty-four pounds: the earth had lost two ounces. So that if water is not convertible into wood or earth, it carries aerial particles of sparry acid and flinty earth with it, into the plant.

This proves, I think, that plants receive from the earth, little beside water, and that must be pure, or the plant will not thrive long, as it should do; their taste is so exquisite, that if they get any impure water, it is certain death to them, by interrupting fermentation in the season of sappy fusion, as is proved by Mr. Hale, B. D. In his experiments, he tried to give a high flavour to apples, by giving the tree some camphorated spirits of wine; and it killed half the tree, viz. the side wherein they were introduced. In 1821, I exchanged some ground with a neighbour, in order to make a fence straight. A fine Sycamore, of twenty years' growth, became my property. It stood upon a hedge-bank. No roots were cut, nor any earth added, or taken therefrom. The ditch was filled with earth. In two years after, I observed the tree was sick, shoots weak, and the leaves yellow. I ordered a hole to be dug above the tree, and found some yellow water that oozed from a peaty soil, which I had taken off by an open drain; but the tree died the winter following. This proves the necessity of having wholesome beverage for plants, as well as animals. I once experienced the inconvenience of bad beverage. A gentlewoman, by mistaken economy in suffering her granary to get so much out of repair, that the rats did as many pounds worth of mischief in one year, as would have put the granary into good repair. I saw twenty quarters of barley sent to be malted: it seemed to be nearly half eaten by rats, and half rats droppings. The malster remonstrated at the absurdity of paying the duty, and melting for such dirt. I told the gentlewoman, that she would be likely to lose all her servants, that knew what was brewed for beer. She was inflexible. I was there the following year, on business several months; and being particularly fond of cold rabbit, I was indulged most days with some, to lunch. In a few weeks, I found the effluvia of my body smelt rancid; and after exercise by walking, my feet smelled as bad as any tame rabbit, dirty hutch; by the addition of rats' dirt beer. I was, in eleven weeks, obliged to retire home, and put myself under a course of simple, wholesome diet, frequent washings, and slept without sheets, in order to let insensible perspiration pass off freely. Thus, in a few months, I found myself as comfortable as ever. This proves the relative affinity between plants and animals. It also proves how tenacious nature is of having the simplicity of her works sophisticated, in the generation of blood or sap, by her own chemistry, with pure water. Fermentation, and aerial matter imbibed, produce water, lymphas, mucilages, milks, oils, gums, turpentines, resins, sulphurs, salts, &c. in different plants, concocted and digested by the genial warmth of the vernal sun. After the sappy fusion or bleeding season is over, they become a glutinous mucilage, or parenchymous substance, which by expansion, force themselves up into new shoots, buds, and leaves. The leaves are formed into their shapes by the qualities of their various salts, and are a protection to new buds, as well as being caterers for food, which enter at their pores, as well as at the pores of the bark along with the air. The ground now is soft, being saturated in winter as above, admits of a further extension of the roots, by the diurnal expansion. Whilst this operation is going on, the fine fermented liquid air ascends and prepares the buds for opening. It would be difficult to find out the power that forces up so many new shoots upon a large tree in one season, if there were not new air vessels formed in the new expanding wood: at the same time, this leather cylinder of bark must be ruptured, although it is strongly begirt by the circumambient air. It also proves a wonderful sympathetic propensity in all the parts forced into a general impulse by the sun's genial warmth, that assimilates the whole to throw up new shoots, and form a new ring of wood, which is simply an horizontal expansion of the parenchymous substance; which, at the same time, breaks all the fibres that unite the bark to the tree; and this is the season for bark peeling, as aforesaid.

I have said it would be difficult to find what power would raise all the shoots on a large tree, I ask, What power would stretch out the bark of an Oak fifty years old, so as to admit of the annual rings of new wood? I believe a steam engine, of one horse power, would not be sufficient. And I doubt whether the steam of an engine, of two horse power, would be sufficient to stretch the cylindrical bark of an Oak, of one hundred years robust growth. No power that is in the earth could force the bark to expand, so as to admit of the new rings of wood, creeping in at the roots, and ascending to the top of the tree, between it and the bark: therefore, it must be by the horizontal expansion of the stem, and every ramification thereon: so that the increase of wood is uniform and regular all over the tree, which could not be, if its increase were by the roots. This is an additional proof of non-circulation of sap. Dr. Harvey first discovered the circulation of blood, in 1728. Dr. Grew denied any circulation of sap, in 1673: F. Cheyne, M. D. in 1705: and Stephen Hale, B. D. in 1727, in his Vegetable Staticks, confirms their opinions. The result of grafting and budding also proves it. For, if there were a circulation of sap, in course the flavour of fruit would be governed by the sap in the stock. Peaches, nectarines, and apricots, budded on plumstocks, would all have one flavour, I have seen a variety of Apple Cyons grafted upon one old tree: also of pears: but they always preserve their distinct features and flavour, which could not happen, if there were any circulation of sap through the coarcture, budding, or grafting place; as by fermentation, it would partake of the sap of the stock. It also proves how little the graft is beholden to the stock, more than to stand in, as a tree is to the earth, that is only to support it with moisture in summer, by its bark; as the whole is dormant in winter. This is proved by Cuttings of trees growing; also, by trees cut in winter, and laying until May: their bark will peel off as well as from them that are standing. I have read, (but I have forgot what in) "That a tree receives but little from the earth besides its standing therein;" and my ideas coincide exactly therewith, which is proved by seeds of trees vegetating and growing to a good size upon old abbey and castle walls, and massy rocks. I have seen Oaks from acorns self sown upon rocks, without any earth upon the rock; but they grew in moss until they were ten or fifteen years old, before their roots ever reached any earth. They were clean and healthy.

and kept upright by the shelter of other trees, as may be seen in most of the rocky woods; as North-Dean Wood, and Elland-Hall Woods, Yorkshire: also, on Sand-rocks, in Sheffield-Place Forest, Sussex. These are proofs of a non-circulation of sap: also, how little a tree is indebted to the earth. Therefore, every tree in the autumn may be considered as a matured seed enlarged, with crown buds for the next year: and so on, one little tree upon another, increasing in thickness by horizontal expansion, annually two rings of wood, by which the age of the tree may be known, when felled, by counting them at the coarcture, or butt-end. If it is a Fir, it may be proved by its annual set of knots, which will be equal in number with rings.

John Hill. M. D. in his valuable Treatise on the Construction of Wood, printed in 1770, has discovered and explained a sixth Member in the stem of a tree, which he calls the corona, or ring of propagation, thus situated:—epidermis, cortical body, liber, wood, corona, and pith. This member is of as essential a service in the trunk of a tree, as the bark is on the outside. It is this corona that gives form to the trunk. It is this that produces the parenchyma. It is this that produces all the buds, leaves, flowers, and fruit. It is this corona, in a green stick, if cut in pieces, and stuck in the ground, will cause it to grow; and it is of no matter which end downwards: with the same sorts as Willows, Elms, Poplars, &c. These are palpable practical facts. They are natural facts, unalteràble.

It is above explained, how vegetation takes place; and how it is annually repeated, to produce new shoots; but not how fruit is produced. It is well known that all trees produce buds for wood, for leaves, and bloom. These, nature performs in the preceding summer; and they are all carefully closed up by the thickened glutinous sap during winter: and in spring, the sap in the tree, like water, varies its weight according to its degree of warmth, and expands accordingly: hence steam or vapour, the power of which is well known, when confined in steam cylinders. When sap in trees is rarified by the vernal sun, and confined by the cylinder of bark, the natural inference is elongation, vertical into all the lateral ramifications, fermenting and thickening daily. The vapourous moist air is daily lubricating and unsealing the buds. When this is done, mark how gradually the liquid herbaceous matter rises daily, if warm enough; if not, it rests, and every day's advance is hardened and coloured by oxygen and aerial gases: at the same time, the woody fibre is formed by the internal salts and carbonic acid, whether it is for woody, shoot, or bloom. If it is for bloom, there is a coarcture, or conjunctive joint formed, where the fruit will fall off at, when ripe. Now, if the empalement of flowers were from an elongation of skin, and the flower petals from bark, &c. How comes the coarcture or joint? It is my opinion that the whole, whether for wood or fruit, rise totally independent of bark; and as aforesaid skinned by oxygen. Petals are not from bark, but formed by their own salts; and coloured by their sulphurs. The attire, pistillum, &c. are all from the parenchyma; and that is from the corona. The woody fibre is formed by the action of gaseous air, drawing the viscous mucilage into towy threads, in the stems of fruit. For, if it were from the woody fibre of a tree, as is generally believed, the attire of flowers is. How comes the coarcture, or deer's horn root? How comes the pulpy covering on fruits? but by the parenchyma. How come stones in fruit, shells on nuts, and grits in pears? but by the parenchyma: all shaped and formed into substance, by the subsidence of their saline salts and tartarous acids, without any dependence of last year's bark or wood. But as a vehicle, by which the materials are brought from the corona, and by the aforesaid gaseous moist air, draws the liquid viscous matter into fruit, or wood. If for wood, it pushes up in the centre and continues there during the summer, feeding the young shoot. In the autumn it condenses daily, and the moist glutinous matter forms into a film upon the top, that hangs to the sides of the tube it formed in the shoot; and so it keeps lowering, leaving these filmy bladders in every stage, which we call pith. There is a pith in all young shoots: but none so conspicuous as the Alder and Rush. Thus nature proceeds progressively in her vegetative operations, to produce a tree; which, if Oak, Yew, &c. at the period of twenty or thirty years, they begin to form their *Tracæ*, or Heart, which is a compound of fixed air, oils, salts, &c. so far within the blea, or sap, as it is generally termed, as to be out of the influence of the sun: so it becomes stationary or consistent, after having filled all the pores of the wood, similar to the milling of cloth: hence its durability over the blea. This *Tracæ* keeps increasing with the tree, until the tree itself gets to its consistency; then the wheels of life get clogged; vegetation is so weak that it will be almost at a stand for perhaps a century, before any apparent decay takes place: the cortical body of bark is no longer qualified to act between the root and branches: the branches die downwards in stiff, rude, unkind soils; but in more open, polite, and congenial soils, for evaporation: the tree keeps growing, until its bulk precludes the genial warmth of the sun, at the coarcture and very centre where life took place, in a tap root. This centre becomes moist, decomposition called dry rot takes place, and the tree becomes hollow: in either case, no quackery can renovate them. Notwithstanding all that have been said and wrote to the contrary: there being neither oils nor gums in white-woods, consequently no *Tracæ*, alias Heart.

26th. Aphorism. Having described and defined what a tree is from the roots to the branches; also the process of vegetation from seed to a tree, producing seed again, it may be asked, "What the composition of the component parts is that constitutes a tree." The last Aphorism opened a large field for discussion, and like this, is a copious subject, which requires an abler pen than mine to do them justice, in that defined manner they deserve; nor can it be done by any but philosophical chemists; such as Drs. Grew, Watson, Thompson, and others; from whose Works, the principal part of this Aphorism is drawn for the recreation of my rural readers, who have not an opportunity of seeing gentlemen's libraries; nor can afford to buy Chemical Works. It is for these brother rustics I write, being zealous for promoting the art of planting. My energy is tempered with reason, and guided by nature's own works, which never gets enthusiastic; nor runs into a bumbastic rage of system, and exaggerated fancy. It is evident that timber consists of little but water and salts, fermented into mucilaginous glutin. And it is also as clear that the lignous woody fibre of timber is but the raw material for paper, proved by that made into wasps' nests annually, from rails, pales, &c.

The purest water, which is rain water, contains earth, acid, nitre, and sea salt.

We know but little of the nature of the spontaneous changes that take place during the fermentation of dunghills, whether the products be soluble or volatile, or fixed. Sir Humphrey Davis discovered in the gases extracted from a common dung-heap, a quantity of carbonic acid gas, carborated hydrogen, ammonia, and acete acid. It was to be wished, that we knew the chemical phenomena could be referred to a few general laws, it would enable us to trace the chemical changes that are going on in the atmosphere; and in the earth, plants, and animals, to their origin. Our notions of the simplicity of nature are very superficial; and we are bad judges of affinity or attraction, graviation, repulsion, sympathy, magnetism, electricity, homogeneous, and heterogeneous.

Juices of plants move with vigour by the influence of heat and cold; abundance of, or scarcity of nourishment, by attracting aerial moisture, whilst the wood is lubricated. In the bleeding season, the bark will come off; but as soon as the leaf expands, perspiration takes place, and the bark will no longer run. Stephen Hale, B. D. denies any circulation of sap; but admits of its expansion by day, and contraction by night: that air is so susceptible of being fixed or volatile, that, from a piece of heart of Oak, green, were generated two hundred and sixteen times its bulk of air. Now, two hundred and sixteen inches of air, compressed into the space of one cubic inch, would, if continued there, in an elastic state, press against one side of the cubic inch, with an expansive force, equal to three thousand three hundred and ten pounds. By this now fixed, now volatile proteus, the shoots of trees are pushed forward, when properly prepared into a viscid, ductile state, by fermentation. He says, "Pease, in an iron pot, put in dry, and some water poured in, by their imbibing moisture, swelled so as to raise the cover with one hundred and eighty-four pounds' weight upon it." He compares this power of expansion with the exertions of the vegetative impulse, in pushing down the radicle of seeds, and the propensity of raising the plume, by attracting moisture, fermenting and generating new matter, according to the nature of the plant, whether oily, winy, watery, milky, or resinous. Dr. Watson says, "That the hardest wood, and the hardest part thereof contains the most oil." And I believe he is correct, by Fir-timber burning so freely on account of its turpentine, alias oil. And *Lignum Vitæ* chips, that are sold out of government dock-yards, will burn almost as quick as shoemakers' wax: and that is the hardest wood I know of. It is imported from a hot climate, Canada. By this may be inferred the cause of all our Oaks, that grow in sandy gravel, being always brittle. Oil of turpentine, and good spirits of nitre, mixed in a bottle corked, and a little warmed, will fall into an empetuous ebullition, explode much vapourous smoke, and become a balsamic gum in a moment: hence the lignous towy fibre of wood by mixtures, generated by fermentation. Oil of vitriol, and oil of aniseeds will unite and produce a perfect rosin: thus are colours and odours produced by mixtures of saline and other salts, with sulphurs, gums, oils, acids, water, air, and caloric. Tastes are governed by the same test; and in roots, the deeper they root, the sweeter they are. All leaves and flowers are white in the bud, and are coloured by the air. All turnips are white under ground, but above ground, some are white, some black, red, green, and yellow; all caused by different proportions of sulphur and aerial matter, united to heat and light, alias caloric. Essence or essential salts, extracted out of the same plant by calcination, and then moistened with water. It is these salts in plants that produce little globulets, which dry to dust like meal, as Auricula flowers and leaves; cotton on Vine leaves, down on Arbeel, hairs on Elm, prickles, nettles, &c. They also govern the situation as well as texture of all sap vessels, and the grain of wood, during fermentation, caused by a sub-acid. Watery, vinous spirit, or phlegm, produces oils, salt, gums, &c. which enter the parenchyma; and then by the gaseous action, are formed into wood, wove in nature's loom; the towy lignous fibre being the warp, spun out of the parenchyma, drawing alkali into fibre, and wefted by the expansion of parenchymous substances.

Ingredients of Plants, soluble in water.

FIRST CLASS.

1st. Sugar.—2nd. Gum.—3rd. Jelly.—4th. Starch.—5th. Albumen.—6th. Extract.—7th. Tan.—8th. Acids.—9th. Alkalies.

SECOND CLASS.

10th. Oil.—11th. Wax.—12th. Resins.—13th. Camphor.

THIRD CLASS.

14th. Glutins.—15th. Caoutchous.

FOURTH CLASS.

16th. Wood.—17th. Suber.

FIFTH CLASS.

18th. Earths.—19th. Metals.

RECAPITULATION.

1st. Sugar. Oxygen 64.—Carbon 28.—Hydrogen 8.—total 100.

2nd. Gum. Oxygen 65.—Carbon 23.—Hydrogen 12.—tatal 100.

3rd. Jelly is in fruit.

4th. Starch is in seeds and bulbs.

5th. Albumen. Milk of plants is in half fed seeds, and is composed of carbon, azot, hydrogen, and oxygen.

6th. Extract or soap of plants.

7th. Tan is extracted from plants, infused in water, and precipitated by an infusion of nut-galls, or better by the precipitate obtained by dropping a solution of glue into the infusion of the plant, in water, by which the following table, with proportions of tan was made from bark of

	Tan.			*Tan.*	
1st. Elm,	2	1	12th. Sallow,	4	6
2nd. Oak, cut in winter,	2	1	13th. Wiggin, alias Mounton Ash,	4	7
3rd. Horse Chesnut,	2	2	14th. Poplar,	6	0
4th. Beech,	2	4	15th. Hazel,	6	3
5th. Willow Boughs,	2	4	16th. Ash,	6	6
6th. Alder,	3	0	17th. Spanish Chesnut,	9	0
7th. Plum-tree,	4	0	18th. Smooth Oak,	9	2
8th. Willow Trunk,	4	0	19th. Oak, cut in spring,	9	6
9th. Sycamore,	4	1	20th. Huntingdon Willow,	10	1
10th. Birch,	4	1	21st. Sumach,	16	2
11th. Cherry-tree,	4	2			

There are eight acids found in plants: first, acetous; second, oxalic; third, tartarous; fourth, citric; fifth, malic; sixth, gallic; seventh, benzoic; eighth, phosphoric, and sometimes sulphuric, nitric, and muriatic acids. *(Thomas Thompson's Chemistry.)*

X.

The only alkalies found in plants are, potash and soda. Oils, fixed, are generally in seeds, as rape, linseed, almonds, Beech, Poppy, &c. The Olive is in the pulp. Wax and tallow grow on the upper surface of many plants. The bees know them. Fat or tallow is fixed oil, in a state of consistence between oil and wax. Resin of Scotch-Fir, and other plants, is a species of oil, fat, or wax; and being soluble in water, is generally used as a varnish, i. e. pitch, tar, turpentine, mastich, sandarac, balsams, and camphor, exist in most plants. Laurus camphorata roots, distilled, produce it in India and China. There is not a simple substance in the vegetable kingdom, that cannot be found in the animal and mineral kingdoms. Sea plants produce magnesia; and land plants produce potash. Divellent and quiescent affinities are analogous to decomposition and fermentation, which are of five orders: first produces bread, second wine, third beer, fourth putrifactive, fifth acetous acid, or vinegar.

1*st*. By barm, or yeast for bread, which loses one-fifth of its weight in baking.

2*nd*. Vinous fermentation of must or bruised grapes, is excited at a temperature of seventy degrees, in fruits less sweet than grapes. If sugar is not added, the fermentation produces vinegar.

3*rd*. Acetous fermentation of beer or wort, takes place at seventy to ninety degrees, and the putrefactive, stinking or effeet,

4*th*. Alias sickening of beer, takes place at forty-five degrees.

5*th*. Acetous acid, or vinegar.

A
NOMENCLATURE OR GLOSSARY
MAY BE OF SERVICE,
By way of Artificial Memory;
Particularly to those who have something to do besides learning words and their meanings.

Alburnum, Aubier; blea or sap of wood, not heart.

Albumen, is the latin name for the white of an egg, alias *Serum*, or the thin white part of blood; milk of plants and seeds.

Alkali, any substance, which, when mixed with acids, produce fermentation.

Astringents, juicy sap, or decoction of agrimony; Black-thorn and Oak-bark.

Air Vessels. (See Vegetable Air.)

Arbor, or tree. *Arbor Vitæ*, or tree of life.

Aborigines, natives from seed, not exotics.

Amputation, cutting off limbs or branches.

Arborator, or tree-pruner.

Antipathies, a propensity to avoid, as Oak dislikes the company of Firs, Beech, Ash, Poplars, &c.

Affinities of Plants, as Willows and Poplars, Alders, &c.

Assimilate, as plants in groups. Larch and Beech assimilate or grow, mixing delightfully.

Acids Saline, or vegetable moist air, forms the pith that pushes up the young shoots.

Acetous Acid, an eager sap; such is discovered by chewing young fruit, tendrils of Vines, &c.

Acids, sulphureous particles in trees, which reduce the amphibious proteus, volatile elastic air, to a fixed air: hence tracæ, or heart of Oak. There are thirty acids.

Atmospheric Gas, Ventosum, or Natro Aerial, an acid spirit, very active. (See Attraction.)

Attraction and Combinations, as leaves on trees attract their aerial food, and mix with their latent juices. Are twenty-seven in number.

Analogous, as Alder and Birch grow alike. Sorrel and young Vine shoots are parallel in flavour. (Similar.)

Azotic Gas, or destructive air, is obtained by iron filings and sulphur, moistened.

Animal Life, is caloric, light, or latent heat.

Arenulæ, or sandy, tartarous, alkalious, gritty substance, in urine, round the cores of pears, and crusts in casks and bottles, holding vinous liquors.

Bibulus, as a sponge, is the pith of rushes, Elder, and the interior of an old Arbeel-tree.

Blea or Aubier. (See Alburnum.)

Bark of Oak, well dried and freed from the outer coat, if an inch thick, a cube foot will weigh seventy pounds.

Combinations of Salts and Acids, are perhaps as numerous as those little black letters of the alphabet, with all the printers' devils, and press-setters' permutations.

Calcination, as burning lime or charcoal.

Calx, is the lime or charcoal, or other substance, after calcination, alias oxyds, and oxydation. A metallic oxydation signifies a metal united with oxygen; and oxydation implies the act of that union. (Thompson's Carbon, Charcoal, or Diamond.)

Cicatrice, or Scar; where any limb of a tree has been taken off, or other wounds in the bark healed by the parenchyma closing it up, as the lips of wounds in animals, it is by surgeons called incarnating, or healing.

Charcoal, new, takes bad smells from cloths.

Charcoal, boiled with stale meat, will take off the smell.

Charcoal, makes the best tooth-powder in the world.

Charcoal is made by burning wood in a smothered fire.

100 lbs. of Pine wood	give 20 lbs.	of charcoal
100 do. Green Oak	give 20	do.
100 do. Heart of Oak	give 19	do.

Thompson's Chemical Essays.

Caoutchouc, alias India-rubber, is extracted from milky plants, and would be white but for being smoke dried. It is composed of carbon, hydrogen, azot, and ogygen.

Charcoal, is 64.3 carbon, and 35.7 oxygen = 100.

Caloric, or light, alias latent heat and oxygen gas, that hardens and colours plants.

Carbonic Acid; the carbonaceous matter is collected by day, so is hydrogen gas. Plants grown in the dark have no carbon. (Dr. Priestly.)

Capitulums, or top-buds.

Crown, or swell, between the trunk and branches of a tree.

Comæ, or branches and leaves.

Cortex, or cortical body; that part used by tanners.

Circuli, Annual Laminas, or concentric circles in trees.

Cremeum, sear, or dead-wood fagots, &c.

Cochryus, mast, or seeds of forest-trees.

Corona, or core of trees; circle of propagation, from which all buds, germins, or shoots emanate.

Coarcture, or off-cut place, close to the ground. (Articulation.)

Dendrologia, or natural history of trees.

Decorticate, to strip off the bark.

Destructive Air, or azotic gas. (See Nitrous Acid.)

Elasticity, joined to fluidity, constitutes air or gas.

Epidermis, skin or outer-bark.

Echinus, Echinatus, prickly, as bramble leaves, shells of chesnuts, &c.

Elementary Fire, or *Phlogiston, Igneous Faetus.*

Exotic, outlandish plants, when imported.

Fermentation, as working by yeast.

Fibrina, fibrous or stringy, or the red part of blood.

Frondation, or stripping off leaves. *(Frondes.)*

Frutex, or woody.

Fusion, or a solution of oily resinous matter, by eager sap in trees, in spring, which bring on fermentation.

Fixed Air, or carbonic acid. (Guyton says.)

Glutin, may be obtained by making dough of flower, and then washing it as birdlime, is from the pounded bark of Holly.

Gelatine, is glue, jelly, or sizing made of skins, fish, &c.

Gums, are from milky mucilage, and may be dissolved in water.

Gas, *Gasamer*, or evaporation of water from the earth, by the heat of the sun; (Dr. Darwin;) and when seen by country people, is called summer goose. I believe many lose their lives by catching it, viz. sitting or standing still in it. It is warm, comfortable, and like insensible perspiration, not visible but at a distance.

Gumous, glutinous, tenacious, sticky.

Gelatine, viscous do.

Gas, ventosum, or atmospherical.

Gases, are distinguished from steam by preserving their elasticity under the pressure of the atmosphere, which proves water not to be a simple, but a compound.

Germin, bud or shoot on the stem of a tree, is not of the cortical body of bark, but from the corona, through the parenchyma or flesh, and carries out the epidermis with it, as gold drawn out upon silver wire. (Dr. Grew.) These germs are in every part of the parenchyma.

Geneculatum, or joints in straw, bents, Alder, Fir-trees, &c. (Articulations.)

Gells, bubbles, or bladders in pith. (See *Bibulus*.)

Hydrogen Gas, or Phlogiston, is inflammable air.

Heat, is a repeller: hence blea of trees becoming heart.

Heart of Oak, is produced by sulphureous, nitrous, and oily gases; and air becoming fixed, by being deprived of their watery particles.

Hydrogen, composes oils and resins in plants.

Heterogeneous, repugnant.

Homogeneous, agreeable.

Incarnation of wounds on trees, by the expansion of the parenchyma, in the form of soft mucilage, and skinned by oxygen. (See Cicatrice.)

Jelly, gluey, starchy.

Julius, or down of fruit, as peaches, quinces, &c.

Juliferous Plants, bearing catkins, as Poplars, Willows, and Salix.

Liber, or inner-bark of trees.

Lactiferous, or milk vessels, as Fig-tree, Dandylion, &c.

Light, or latent heat. (See Caloric.) No wood is produced by any vegetation, without light. Whatever vegetation produces without light, is always herbaceous and blanched. The carbonaceous matter is produced by day; so is hydrogen gas.

Lymphæducts, vessels for lymph, water &c. Aqueducts.

Lacteals: (see Lactiferous:) as in Thistles, Poppies, Figs, &c.

Lignous, or woody fibrous, towy part of wood, is the warp.

Lignum, wood. *Lignum Vitæ*, or wood of life. (See Arbor Vitaæ.)

Lixivial Salts, are obtained by calcination. (Lee.)

Mucilage, gum, or sap, is the parenchyma, and differs from the woody fibre, merely in containing less oxygen.

Mixtures, produce odours, nitres, sulphurs, oils, turpentines, &c.

Mixtures, as of nitrous, mariene, and volatile salts. There are six causes of mixtures.

1*st*. *Congruity*, or respondence between the sizes of, or figure of their parts.

2*nd*. *Weight*, added to congruous parts.

3*rd*. *Compression*, is analogous to weight.

4*th*. *Solution*, or dissolving of parts, by fusion.

5*th*. *Digestion*, by warmth, causes fermentation.

6*th*. *Agitation*, as exercise to animals, and churning for butter.

Milky Sap, is oily, and turns to gum. When dried, it will burn brilliantly. It is in all half-fed seeds. (Albumen.)

Mucilages, from acidelous sap, to phlegm, milk, oils, gums, &c.

Nitrous Acid, is of animal derivation, formed of azot and oxygen, during putrefaction; and is generated by any kind of filth, stagnant water in ditches, woods, &c. marshmiasma, or contagion of febrile diseases, as epidemic, intermittent, and yellow fevers. The marsh effluvia is the most pernicious in hot weather. (Dr. Mitchell.)

Natro Aerial, an acid spirit, very active.

Nucamentum, or catkins on Pine, Hazel, Birch, and Alder.

Oxygen, combined with light, alias caloric, composes the pure part of the atmosphere, or vital air: it is two-thirds oxygen. Azotic gas, or phlogistic air, combined with caloric, composes one-third part of the atmosphere, and is one of the principal component parts of animals.

Oxygen produces green. Hydrogen deepens it.

Oxygen gives flavour to truit, and hardness to wood and bark.

Oxyds, signify metallic powders.

Odours, are drove out by fermentation.

Oliferous Vessels, oil bladders, are milk vessels.

Pabulum, food for plants, animals, minerals, and fire.

Parenchyma, is flesh or weft of wood.

Phosphorus, is made of burnt bones, and sulphur.

Phlegm, is an aqueous and insipid, watery, fluid muscous.

Phlogiston, or hydrogen gas, alias inflammable air, alias fire damp in coal and other mines, wells and vaults.

Petiolus, or fruit-stalks, are foot-stalks of flowers, peduncles, pedicle.

Pistillum, *Euterus*, *Matrix*, or true seed-case of plants.

Pollen, or male-seed, anthers, &c. a fine dust inclosed in the thecæ, or globular summits, or on anthers, supported on stamens.

Repelling bodies, are but two, viz. caloric and light: hence tracæ in trees. (See Attraction.)

Resiniferous, as in Pine and Fir-trees.

Rosin, is but turpentine, dried.

Ramusculi, or ramified branches, or boughs.

Roreferous, or dew vessels; as in all hollow stems and piths.

Rorefluent, flowing with dew; as in Elder-pith.

Rorefluent and Resiniferous in Oak-bark; hence tan and Oak-galls.

Salts, there are one thousand seven hundred and sixty varieties, all bred from thirty acids. All acids form salts, with alkalies, earths, and metallic oxyds.

Salts Nitrous, are visible on glass windows by frost, curiously damasked, where the rooms are plastered, or occupied by animals; otherwise the frost only makes it look as plain and impervious as ground glass.

Suber, rind or cork. It is thought that the epidermis of all trees is a substance, possessed of the same properties as cork. There are only four earths yet found in plants, viz. lime, silica, magnesia, and alumina. Silica abounds in all grasses and stalks of corn: the epidermis of which is half silica, viz.

Thomas Thompson, M. D.	55	Silica.
	20	Potash,
	15	Phosphat of lime.
	5	Carbonat of lime.
	5	Loss.
	100	

Silica, or quartz, sand, flint, and silex.

Sea-water, is	96.00	Pure water.
	3.25	Common salt.
	0,64	Muriat of soda.
	0.11	Sulphat of lime.
	100.00	

Saline, or vegetable, vapourous, moist air.

Schistus, or hornstone, is black, blue, purple, &c, Slate.

Stalactites, are like icicles, pendent from roofs of caverns, arches of bridges, &c.

Y.

Sinovia, lymph or joint oil, alias gouty oil, oozes in abundance from the joints of four or five years old bullocks, when hanging in the slaughter-house, and is not unlike the sap of trees, at the time when the bark is loose and buds opening.

Sarmenta, the bush and peduncles on which grapes hang.

Scobs, or saw-dust: also auger-chips.

Succiferous, air and sap vessels, alternately synonymous.

Stones in Fruit, and Shells on Nuts, are formed by the sap casting off, and precipitating the tartar.

Solution, by moisture, after which, fermentation takes place by the mixture of the nitrous, mariene, and volatile salts. It generates wood, or starch and tow.

Solution, by air and water, unconfined, destroys the cohesive quality, separates, dissolves, and decomposes all bodies, vegetable or mineral.

Sappy Fusion in trees. The bark is a digester, and the sun is the fire.

Saps, of trees and herbs, as well as sap vessels, vary: milky or white, as Figs, Lettuce, &c: yellow, as in Celandine, Rhubarb, and Barbary: watery, in White Woods: winy, in Plums, and Vines, Vinous: oily, in Olives: pitch, tar, turpentine, &c. in the Resinous tribe, as Pines, Firs, and Larch.

Scapus, or upright stem.

Surculi, shoot, scion, graff, slip, or imp.

Sympathy, as Poplars, Larch, and Beech grow well mixed.

Truncus, a tree without boughs.

Turiones, tendrils or claspers, as Vines, pease, briany, &c.

Tracæ, or heart, as heart of Oak, Yew, Cedar, &c.

Tartar, or essential salts.

Turpentine, dried, is rosin. It is, at first, an acidelous liquor, then a mucilage.

Thecæ, or seed-case.

Timber, rotten. (See Wood.)

Tracheæ, or wind-pipes. Air Vessels are sap vessels, if any.

Ventosum, vapourous.

Vascular, fibres.

Volatile Salts, are tartarous, essential essences.

Vegetable Air, is moist, vapourous air.

Water, eighty-five parts oxygen, and fifteen hydrogen, with caloric. (See Sea-water.) Thompson.

Wood, when the rotten and gaseous matter is gone, is composed of a little vegetable earth, carbon, oil, and a little iron.

Wood, sound and green, is composed of

56	0	Oxalic acid.
4	0	Citric do.
0	4	Malic do.
0	5	Acetous do.
1	0	Azotic gas.
8	1	Carbonat of lime.
30	0	Residuum.
100	0	

This residuum was found by distillation to be composed of

26	62	Alcohol and an acid.
6	977	Concrete oil.
22	995	Charcoal.
3	567	Carbonat of lime.
39	841	Gas, half carbonic, and half carbonated hydrogen.
100		

Wood. (See Charcoal.)

By these facts, it appears that wood of plants is composed of oxygen, carbon, hydrogen, azot, and lime; and it is thought that mucilage differs from woody fibre, merely in containing less oxygen. Mucilage, gum, or sap, is composed of the same ingredients as woody fibre, alias carbon, alias charçoal.

Zero, absence of heat, perhaps three hundred degrees below the freezing point of the thermometer.

CHAP. XXXIII.

ON WOODS AND FORESTS.

MR. EVELYN says, "A forest is properly an arbour for wild beasts." Woods, he knows not how to distinguish from forests. In Warwickshire, woodland is called *Ardena.* Also in Germany, the Arden-wald was more than one hundred miles long, from whence our own Danica Silva (Forest of Dean) might probably derive its name contracted, and *Diana Nemorensis* found under the British *Arduena* and *Arden.* The forest laws for preserving timber are very severe.

Historical origin of our may-poles. It was a Roman Revel. He says, "It was to be wished, that our tender and improvable woods should not admit of cattle by any means, until they were quite grown up out of harm's way. The trees would be of infinite more worth: also, were the standards allowed to stand or grow to timber, and not to be cut at the next felling of the wood, as frequently done. (One hundred and sixty years past! and this barbarous system lives yet, notwithstanding MR. EVELYN's wise and strong remonstrances.)

Lieutenant Colonel A. Emmeric, Deputy Surveyor General of the Royal Forests, Chases, and Parks, in his Work, printed in 1789, says, "There was a committee of the House of Commons appointed to examine into the state of the forests;" but he does not say what was the result; nor has he written any thing upon the subject worth transcribing, except for the amusement of my readers, I give his proposed establishment, which I think the whole produce would not cover the expense, exclusive of labour.

1st. Surveyor General.	4th. Land Surveyor.
2nd. Deputy do.	5th. Timber do.
3rd. Rangers.	6th. Nurseryman.

7th. Seedsman.
8th. Planter.
9th. Riding Messenger.
10th. Foot do.
11th. Attorney.
12th. Forest Office Treasurer.
13th. Surveyor's Secretary.
14th. Under Clerk.
15th. I take the liberty to add a Druid Priest, as Chaplain to fill up the group.

In 1662, Mr. Evelyn proposed a Committee. In 1789, Mr. Emmeric published his opinions on Forest Timber; and in 1807, a string of quæries was issued from the Office of Woods, Whitehall-Place, London, by the Surveyor General. These quæries are forty-six in number; many of which have been answered: and many answers might be gleaned out of this work. One hundred and sixty-two years since, as above stated, Mr. Evelyn complimented the art of planting, a science. It is evident the art is so far from being perfected, that by inspecting the old groves, skeletons of old avenues, and Evelyn's Silva, we are in a retrograding state. He says, "No tythe of wood after twenty-two year's growth; and that Willows, Sallows, and Oziers are protected by the same statutes, by the 13th, and 27th of Queen Elizabeth, Chapter 25th, 19th. Section."

Simon Sturtivant, obtained a patent of King James, in 1612, for smelting iron ore with mineral coal, instead of charcoal, page 251. He gives some instructions for inclosing and planting forests, &c. 254.

The greatest obstacle to a general improvement of the timber in forests, is that of ascertaining the boundaries of purlieus and borderers; that being accomplished, the rest is easy, with the assistance of a good plan, specifying the boundaries, roads and soil, as clay, marle, sand, gravel, loam, heath, peat, or bog; then as proposed in the third chapter of this work, inclose as most convenient, for interference of roads, from ten acres to any greater quantity, to be marked upon the map, and named as Kingswood, Forestwood, &c. The ditch and bank, will be a complete cheque upon the ravages of fire, in case of accident, particularly so, if double ditches, eight feet apart, and bank between: and this should be planted with acorns, at a foot distance, when the bank is settled; which will be the year after casting, or being made. The next thing is sowing and planting. The cheapest way would be to let the inclosures by the acre, to the nearest Nurseryman. A better way perhaps, would be to select a proper place as to soil, sandy loam, for a Nursery, to be let as such for a Sale-Nursery, and pay the Nurseryman, at per acre, for sowing or planting; and where there is a similarity of soil, I would have one wood from seed, another entirely planted; and such to be regularly entered by their names, (seed-wood, and planted-wood,) also duplicates put into the parish Church chest, and into the hands of neighbouring principal gentlemen; to prevent a possibility of its not being handed down to posterity. One should be deposited in the nearest Port Admiral's Dock Office, as Portsmouth, for New Forest; and Devon Port, for Exmore-Forest, and Dartmore.

CHAP. XXXIV.

MR. EVELYN goes on.—Since our forests are undoubtedly the greatest magazines of the wealth and glory of this nation; and our Oaks the truest oracles of its prosperity and happiness; as being the only support of that navigation, which makes us feared abroad, and flourish at home:—it seems strange, that the Royal Forests should be so much neglected: as the Forests of Dean, Sheerwood, Enfield-Chase, &c. are, for want of proper inclosures and allotments, to the borderers, fenced off by such fences as are above described; viz. double ditches, with ample space between, for Nursery. How goodly would be the sight, if the demesnes of our country gentlemen, were crowned and encircled with stately rows of trees, avenues, and groups, as adorn New-Hall, Essex; Greenwich-Park;

Cashiouberry; Stanstead; and above one hundred more named in page 261: including the Seat of George Pitt, Esq. of Strathfieldsay, Hants. In 1659, there was timber, mostly hedge-row, valued at ten thousand three hundred pounds; besides ten thousand tellers, or samplers, not valued. Besides these, there are New-Forest, Windsor, Ashdown, St. Leonards, Epping, Panbet, and Chute; some are forests without trees. Well might MR EVELYN say, "It seems strange, the Royal Forests should be so much neglected." However the cause is obvious, and the remedy exceedingly simple. The present system is not only bad, but the very worst of a bad kind; as every acorn that vegetates in the glades, is eaten up with the herbage; and those which vegetate in the thickets, and have luck to get their heads above the thorns, it is at such a height, that not one in ten, will produce any knee-timber. This proves it to be as necessary to extirpate the bushes, as the cattle, alias forest-pruners; and the remedy will present itself in the subsequent part of this work.

Now the cause being removed; in page 268, he gives us the plan of a wood, of one hundred and twenty acres; laid out into eighty compartments, by vistas twenty feet, and walks eight feet wide. Its name is Mosely-Wood; it belonged then to Kirke, of Cookridge, Esq. After him, Sir John Sheffield; and now to Richard Wormald, Esq. It is situated five miles from Leeds, near the road to Otley, and five miles distant therefrom. It evinces more zeal than judgment, in the designer. (See the plate.)

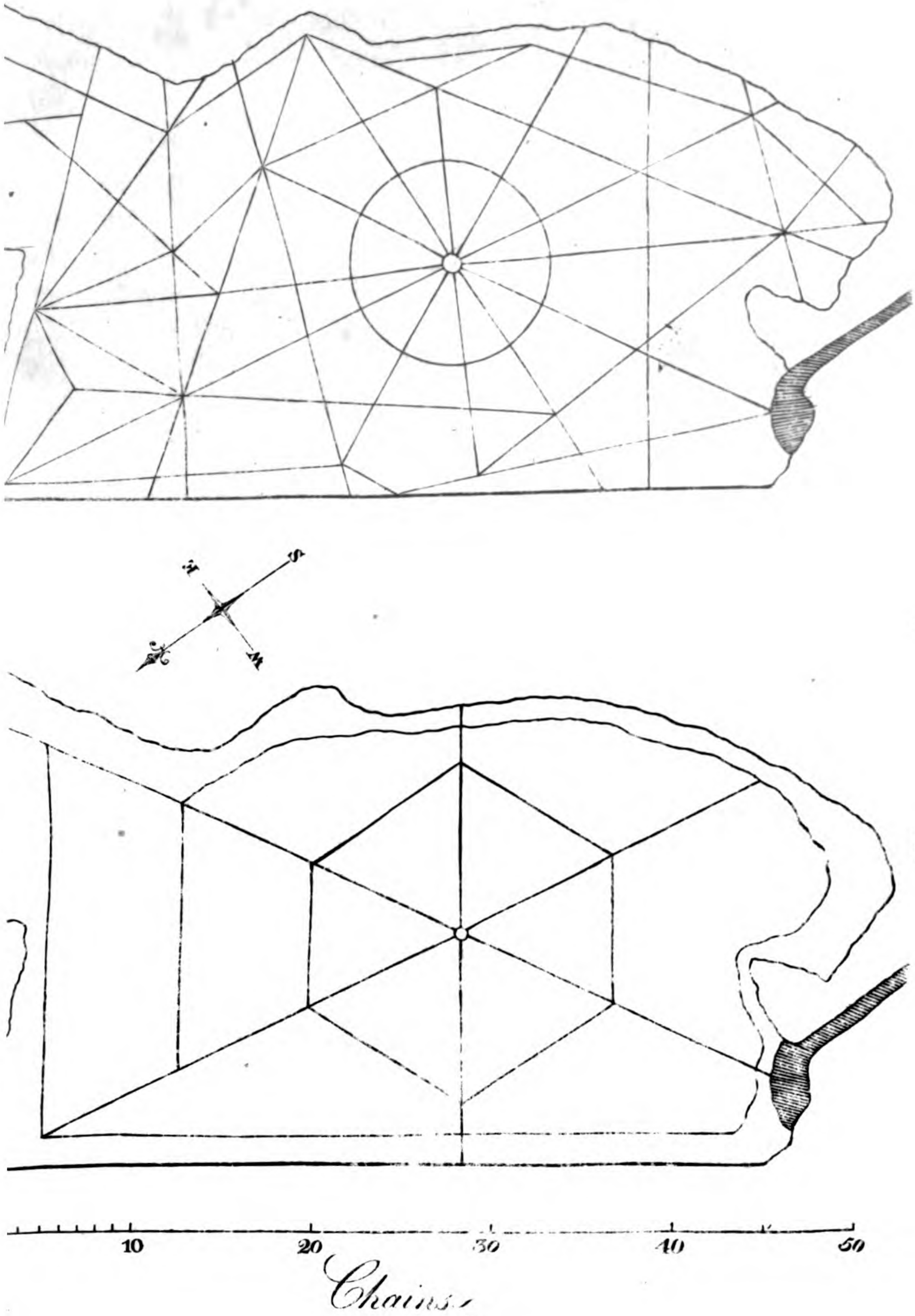
One hundred and twenty acres divided into eighty, average one acre and a half per quarter, bed or plot. In the proposed annexed design, is nineteen plots, viz. six acres; average of each plot.

On the 29th of April, 1824, I visited Mosely-Wood, and found a good Oak in the centre, twenty feet stem, and nine feet in circumference; which proves that good Oak may be grown here, by allowing it to stand long enough. The wood is in a bad state; there are not sufficient plants in it, for either a wood or a coppice; nor yet to confine the eye to the rides. Those who have extensive woods, and want hunting and shooting rides, should visit Stow, in Buckinghamshire; Stanstead-Forest, in Sussex; Charleton-Forest, at Goodwood, in Sussex. It may be objected to so much land being sacrificed to roads: I know by experience, that more Coppice-wood, as well as timber, can be grown in a well laid out wood, than in a large thick cover: timber grows much faster, and the bark is double in value. Martin says, "Wood-grove or Coppice-walks, adjoining to a garden, should be ten to fifteen feet wide; and as much Shrubberry on each side:" he condemns all straight walks, as well as over crooked: he seems quite alarmed at the decay of woods; and says, "Nothing short of sowing for new woods will save us."

Now, as to Mr. Martin's serpentine or curvilinear walks, they may be right in a Shrubberry, or Wilderness-walk, where curves are made to extend the walk, so as to give it an air of magnitude: but I say, where there is room, by no means make crooked walks, except the boundary authorize it; as per Mosely-Wood, 2nd plate. Never fear letting cold in. It is the straight vistas that give an impetus to the circulation of air in woods; which renders them sweet and healthy. Few woods are so level as to be seen through; the undulations of ground prevent that. Stanstead avenue was cut through the forest, in the year 1683. It is a mile and a half long, and two hundred and twenty-five feet wide; forty-four acres. One of a mile long, should be two hundred feet wide. Half a mile long, one hundred feet wide. A quarter of a mile long, sixty-six feet wide: and never narrower than forty-five feet. For timber carriages, in woods, thirty-three feet wide. Auxiliary timber carriage roads, in woods, sixteen and a half feet wide. Hunters' rides, and shooters' walks, eight and a quarter feet wide.

Page 184.

52 ½ Perch pr Inch



Moses Cook gives directions, in page 187, how to find a straight line through a wood, or plantation.

My own plan has been, to set up a pole ladder, in the ground at one end of the intended vista, (as per figure;) and a long pole and white board at the other end, with some intermediate ones: with these, and a few straight, white rods, or rods with white paper put into a cleft at the top of each, called feathering, avenues may be cut straight.

CHAP. XXXV.

History of Groves.—Sacredness of Groves, &c.

THE history and sacredness of groves dip so deep into tradition and heathen mythology, that I consider it of no use to introduce them into this brief compendium.

MR. EVELYN felt a difficulty in ascertaining a distinction between a chase and a forest. I feel a diffidence in pronouncing at what age or growth a wood or plantation changes into a perfect grove; as all groves were originally a plantation, coppice, wilderness, shrubberry, thicket, clump-wood, ranges of trees, and ultimately a grove, ornamented as the size, situation, and taste will admit of; as wood walks, shady walks, straight or serpentine avenues, recesses, glades, or open spaces, with ranges of trees, groups, labyrinths, &c.; to which are added temples, grottos, alcoves, ruins, hermitages, rock-work, and if any water, bridges, cascades, and fountains. The best grove I ever saw is at Barnes, near Beaconsfield, Buckinghamshire. It was planted by Waller, the celebrated poet, about the year 1730; and is composed of Firs, Beech, Oak, Spanish Chesnut-trees, and Cedars of Lebanon: they are eighty or ninety feet high, and eight feet in circumference, at four feet above the ground; but stand so thick, that I believe they will not swell much more, for want of ampler heads. Here are grand terraces, both grass and gravel, slopes and lawns, with evergreens thereon; some clipped, and others full headed, from twenty to forty feet high: ponds and bridges in vales, statues, &c. Near this, is Dropmore-House. The grounds are laid out in the most modern taste, as shrubberries, roseries, conservatories, aviaries, temples, arcades, wildernesses, with lakes for aquaticks, and grass rides through the forest scenery to the farm, whose arable fields are bordered by grass rides.

The above is sufficient, by which may be formed domestic groves for pleasure and shelter, near the mansion. There are park-groves for ornament; also, forest-groves, as that at Stanstead, Sussex, which was cut into avenues and rides, by Lord Scarborough, 1670 to 1680. In the seventeenth century, it was in the Court of Chancery, and by order of the Lord Chancellor, the whole was felled and cleared off, consequently it became a coppice, thick in some places, and in others thin. The steward, Mr. Cathery, in the years 1760, 1761, and 1762, had acorns collected and dibbled in the thin places, and on the sides of the rides, by line, just a rod, one acorn from another, which grew up into straighter lines than can possibly be obtained by planting trees. These rides were parallel to each other, direct north and south, at one hundred and fifty yards distance, intersected by others at right angles, direct east and west, at thirty-two chains apart, all over nine hundred acres. By these rides, the whole laid in beds of twenty-two or twenty-three acres each. Three hundred acres of this were well fenced in, and only indifferently managed. In 1809, it was the grandest grove I ever saw. When I began to thin it, notwithstanding all that is said about straight roads letting in cold, I found all the outside trees averaged one-third more timber, four times more lop, and double the quantity of bark in weight, being as thick a-again: hence the necessity of timely thinning. As to pruning, they had pruned themselves severely, with the assistance of Beech, which grew among the Oaks. They had done much more mischief than they were worth; and by eradicating them, I reduced that beautiful grove in places to a mere forest again, with groups of Oaks, and glades with straggling Oaks and Thorns therein. Beech is of too quick a growth for Oak, on down land. In fact, Oak ought never to be molested by any mixture whatever. The cause of the bark being so thin in the interior, was for want of sun and air. The trees are drawn up with small spiral tops. Under-wood and all lateral branches are weak and sickly. This is generally the signal for thinning. It would, then, be more profitable to cut the whole down. However, the thinning takes place, and those which are left have such weak, bad tops, that they cannot feed upon the aerial and vapourous pabulum, sufficiently to swell the stem. The sun being thus abruptly let in upon these tall stems, with blanched bark, the sap expands unusually, and shoots break out all over the trees; and the tops languish several years before they recover. Then, much to the prejudice of thinning. There is a general clamour.—The wood is ruined by letting in cold winds.—The real fact was, the want of cold being let in sooner by perhaps seven years. Our climate is never too cold for Oaks, in winter. All Oak-woods, alias Coppices should be thinned, if seedlings, at about ten or twelve feet high, and pruned to five or six feet stems: also, to be left at five or six feet distance: and when twenty feet high, thin again, to eight or ten feet distance, and prune up to ten or twelve feet stems: at thirty feet high, thin again to any convenient distance, as near fifteen feet as possible, and prune in the same proportion. The under-wood of these three copsings will be valuable, but from this time, grows weak. The next thinning to be at forty feet high, twenty feet apart, and pruned to twenty feet stems. Now, I term this a perfect grove; and as there is no under-wood, the grove should be carefully inspected every two or three years: but instead of looking at the stems any more, for distances, you must look up, to see that their tops do not interfere; where they do, taking one out, sometimes relieves half a dozen. This inspection should take place in August or September, when the foliage and acorns are the heaviest. And every tree condemned, should be marked with a ring of white paint, to stand until the next bark-peeling season. Be careful at all times, and at all thinnings, to leave the handsomest trees growing.

The following synopsis will shew what room is required to grow large old timber, which has always good thick bark. The heads are not taken into quantity, but the diameter of heads are taken to shew how many can be grown per acre, on minor downs and Stanstead park,

Years old.			Length.	Quarter-girt. Inches.	Contents in Feet.	Diameter of heads.	Trees per acre.	Feet of timber per acre.
300	5 Hedge-hogs in Park,	1	16	60	400	90	5½	2200
130	Grove on Clay Marle Hill	2	27	8	12	12	302	3624
	Grove on Oaks, ...	3	29	9½	17½	21	98½	1723
	do. .... do.	4	38	10½	20	30	48½	1358
	do. .... do.	5	30	14	40	45	21½	860
	do. .... do.	6	40	12	40	30	48½	1920
	do. .... do.	7	30	15	47	30	48½	2256
	do. .... do.	8	15	16	26½	45	21½	838½
			15	11	12½			

Had this grove been thinned at proper periods, there might have been as per seventh tree, per acre; and the thinnings sold and put out to interest, would by the time of this fall, have accumulated to as much in money as the whole broke or crop, and the fee-simple of the land they grew upon.

N. B. They were all planted in 1676, and entered in the Steward's Journal, "Oak Grove."

The alarm-bell has been rung one hundred and sixty years, to guard against a scarcity of timber. Is the cause removed? I answer, No; it increases daily; almost every nation upon the face of the earth is become so civilized, as to have all manner of craft, from Canoes to Men of War.

A ton of rough timber is allowed in ship building, to every ton burthen she measures to. Suppose a ship of two thousand two hundred and fifty-six tons; that is as many tons as there are feet of timber, per acre, of the seventh class, in the above table: and as fifty feet is a ton, such a ship would clear just fifty acres of such trees; and I doubt, if there is one such to be found in England.

At Quebec, in North America, was built, a ship, called the "Baron of Renfrew." She was launched on the 26th of August, 1825: her length is three hundred and nine feet, and has taken six thousand tons of timber in the construction of her only.

She is now on her passage to England, with a burthen of nine thousand five hundred and fifteen tons of timber; so that ship and cargo have cleared off fifteen thousand five hundred and fifteen tons; or the whole produce of not less than seventy years' growth, from at least three hundred and forty acres, as the seventh class: and it would take twice the time to grow as much in Norway or Sweden. The consumption increases with the increase of population for machinery and buildings, as well as shipping and small craft.

The American timber is coarse in the grain, and not durable. It is well known to those who are conversant in the growth of timber, that after a tree gets to its consistency, viz. from seventy to a hundred years' old, that its annual rings are very thin. I have a piece of Norway Deal, now before me, that the last seventy years' growth of rings, before it was felled, do not measure quite two inches. Such Deal is little inferior to Oak, for strength.

It is evident from these tables, that grove timber, fit for planks, will pay best for growing; viz. from twelve to twenty inches, the side of the square. If cut sooner, it is not so valuable; and if suffered to stand longer, it will not pay; as the trees are approaching too near their state of consistency, if tall well trained trees.

An old Beech-wood, at Stanstead, called Buster-Hanger, was totally cut down, in 1764. There sprung up an abundant crop of Seedlings, which was well managed: as to thinning, the woodmen had been careful never to meddle with the outside trees. When thinning, the interior pruned itself. The outside was as thick as a hedge, and green in summer to the ground; except at the entrances. I had it gradually thinned, every winter, from 1807, to 1814. When the trees were seventy-five feet high, and clean stems thirty to fifty feet high; when in leaf, the sides being thick, and the tops formed a complete canopy, made it gloomy in the interior; and so sublime, that I never entered it, without feeling that kind of religious impression upon my mind, one feels on entering a cathedral, or church, amongst pillars and massive arches! Such is the effect of tall stems of trees, and their ramified tops; this it must be: and not the spaciousness of woods or abbeys. Westminster-hall is the most spacious open room, I ever saw; but on entering it, one never feels that reverential something. I thought it wanted nothing but the pavement to be covered with saw-dust, to make a good riding-school. But to return to the grove: this is not a grove of a few acres; it is twenty-five acres, part of a large wood, that is all rising rapidly into a grove; if properly trained by judicious

TABLE OF TREES,

taken standing, and the Circumference near the ground.

en and a half feet apart before they were thinned.

	Age	L.	G.	C.	diam	trees per acre	Feet per acre.
ntalis, ...	40	60	84	46	16½	160	7360
, ...	40	70	72	39	16½	160	6240
....	40	60	72	34	16½	160	5440
....	40	70	96	70	16½	160	25200
ut-tree, ...	40	70	96	70	16½	160	25200
y, ...	25	55	60	21½	20	110	2365
plar, ...	25	65	84	50	15	193	9750
....	25	40	48	10	20	110	1100
....	25	50	84	38	20	110	4180
narrow leaved,	25	40	60	16	15	193	3088
nd Cluster, ...	25	30	50	9	15	193	1737
plar, ...	25	50	80	35	15	193	6755
ut-trees, ...	25	25	50	7	15	193	1351
....	25	25	40	4½	15	193	868
ne, ...	30	65	60	25	20	110	2750
bele, ...	30	80	96	80	30	48	3840
ut-tree, ...	100	74	130	136	30	48	6528
....	150	70	204	315	90	5¾	1691
....	150	70	216	352	90	5¾	1886

olumn under L. is the Total Height of trees.

thinning: pruning is totally out of the question: for Beech nature will do that herself. The soil is all chalk, in which the trees have so little hold, that in felling a tree, I have seen it pull another down by the roots. Another proof, I think, that wood is not produced by the roots. The best part is nearly level; and the other part hangs to the east; where the trees are as tall, but not half so thick in the girt. The cause is obviously want of sun, to rarify and expand the sap and parenchyma; also to warm the earth, so as to raise evaporation; on which the wood is fed.

There is a Beech-grove at Mount-Edgecomb, of some acres, upon the summit of the Mount, and five or six hundred feet above the level of the sea. It was planted in straight lines, with six feet intervals, surrounded by a thorn hedge. The west winds from the sea, are so powerful here, that they have battered the young shoots on the west side; so that the outside trees are no higher than the thorns: but others rise gradually to eighty feet high, with fine clean stems of forty or fifty feet: but by reason of them standing in lines, they have a meager appearance; and for want of timely thinning, their tops form one heavy looking mass, as even, as if clipped. Had they been duly thinned, twenty years back, and every four or five years afterwards; one-fifth of the number now standing, would have been of more value, than the whole is now worth; besides the pleasure of having the grove broke at the top into light and shade, fit for the landscape painter.

Caution.—In taking down an old grove, never fell the outside trees, until the whole is to be cut; but keep drawing annually from the interior.

I knew a beautiful grove, upon one of the Minor Downs in Sussex, that had been judiciously trained: all the interior fine clean stemmed trees, just fit for plank-logs, and the outside feathered to the ground with rural foliage. In summer, it being considered as ripe for market, a broke was cut, by beginning at the outside, on the west end;

a horrid breach, that disfigured the whole country! If the steward had all windfalls, he opened the right aspect for some. So it stood for ten years, as an eye-sore to me. I never saw it, but some contemptible idea fell upon the steward,—as having placed an old barn before me, with the gable-end fallen in; or the stern of a peacock when pluming itself. Both harmless objects, but not decent. Do you desire to know how this happened? I will tell you. During Lord North's administration, a Deputy Surveyor General, (one Lieut. Col. A. Emmeric,) was nominated for the royal forests: he published a silly pamphlet on the subject; by its dashing title-page, it found its way into all law stewards' offices; and the above mutilated grove was under the control of a law steward; who by his oracle disgraced himself, as well as the grove.

CHAP. XXXVI.

ON EARTHS.

BEST lands are such as are a due mixture of sand and marle, upon a substrata of gravel, sand, chalk, &c. Such never want draining; they admit of rain freely, and remit its gaseous evaporation freely and gradually in all dry seasons. Such civil polite lands, are never too wet; producing abundant crops in all seasons, with but little tillage and manure: such are silty marshes. Chalky, sandy, and gravelly soils, require no more tillage; but double or triple the manure. Clays are too retentive: chilled in wet seasons; and so churlish and stubborn in dry seasons, they require a winter or two's discipline; by being exposed to frosts; by ploughing into narrow ridges, in autumn; and vexed all summer with ploughs, harrows, and spike-rollers. Thus they may be subdued, and kept in temper, by adding sea-sand, chalk, brick and mortar rubbish and pit-sand; but never lime, as it is a binder, except it be effete, or reduced to mortar six months before it is laid on. In this state, too much cannot be well laid on, either for grass or corn: thus, clay may be taught to emit that kind of evaporation. That is the pabulum, or food of plants, raised by sunshine: and, it is well known, that shade will render the most fertile land barren; as will too much exposure to the sun, without a crop or frequent turnings. Few soils are prolific long, for grass or corn, without auxiliaries of tillage and manure. Over-manuring of any kind is worse than under-dressing.

I do not know any thing so barren as marles and salt in mass; nor is manure of much avail, unless the surface is kept open by the plough, harrow, fork, hoe, &c. as in drill husbandry; so as to inhale by night, and exhale by day. This is the soul of vegetation, as well as the true circulation of sap in herbs, as well as trees, on all land; and there is a great variety.

1st. Vegetable mould is black, fat, porous, and light, as are bogs, boggy marshes, peat pits, decayed leaves, &c. 2nd. Peaty earth.—3rd. Heathy is vegetable matter and sand.—4th. Lomy-sand.—5th. Sandy loam.—6th. Gravelly loam, as Middlesex.—7th. Clay loam.—8th. Marley loam. —9th. Sandy marles, good.—10th. Chalky loams.—11th. Chalk land.—12th. Sand land.—13th. Gravel.—14th. Clay. —15th. Marle.

There is a grey sort on the hills, west of the Magnesian limestone, in the west-riding of Yorkshire, that, by transition, becomes Yorkshire Stone, well known in London, under that name. It is bounded on the north by the Craven limestone; and on the south by the Peak limestone of Derbyshire.

Schistose True, is Saddleworth Claystone. It lies nearly level, with a rivulet in a vale, and twenty feet of rubbish over it. It is as soft as chalk, free of grain, and is worked into baking-stones, by drawing-knives, made from old reaping hooks.

MR. EVELYN gave a lecture upon earths, before the Royal Society, on the 29th of April, 1675; to which I refer my readers, and proceed to something like geography of earths: as they are heterogeneous and nondescript; consequently they do not come under the appellation of mineralogy, or geology; nor has either of them told us yet, whether the earth was originally of one uniform mass as a turnip, or laminated as an onion, or slated by scales as a lilly root, or mixed as we now find it: save and except the changes by convulsions, by fire, water, nature's chemical laboratory, and human art; by which, nature is frequently interrupted with drains, canals, roads, quarries, and mines; which not only alter the nature of the surface of the earth, but the minerals also, by suspending, diverting, or annihilating the chemical process. Mineralogy nor geology has little to do with earths fit for the planter; yet, as all minerals are composed of earth, they will, by decomposition, return to earth again; therefore it is necessary to take some of the minerals into account, the better to understand what earths are; which chemists enumerate as varieties enveloped in such hard names, that few planters can understand, viz.

1st. CLASS, and 1st. ORDER.—Silicious or silex, or silica: their stones are flint, sand, and ironstone; always in clay.

2nd. ORDER.—Silicious trees, crystals, and Bristol-stones.

3rd. ORDER.—Agates, onyxes, Scotch-pebbles, sardonyxes, &c.

4th. ORDER.—Of Flint is sea-sand, a species of which is gotten at Lynn Regis, in Norfolk, for glass making.

5th. ORDER.—*Chertz* or *Petosilex*, mixed with marble and limestone, as pebbly gravel and boulders, generally liver-colour, with dark spots.

6th. ORDER.—Of Flint is the nodules found in chalk; some are round, others long-finger shaped, and some taper; always hollow, and generally filled with sand.

7th. ORDER.—Silicious sand and gravel, cemented together by selicous cement, then called brechia, and plum pudding stone.

8th. ORDER.—Finishes with Basaltes, granites, porphyries, and boulders of Scotland.

2nd. CLASS.—*Alumine*, or clay, with lime makes marle and many orders, as alum-rock, shale, stone brash, or breeder. Coal scale, granites, or toadstone, morestone, ragstones, schistose, slate, &c. are all marles, or an union of the acid of sulphur and pure clays: and argillaceous schists compose porphyry also: and lavas decomposed are of an argillaceous nature: hence calcarious earths.

3rd CLASS.—*Barytes*, or heavy spar. *Strontian* is an alkaline earth, clay, or marle, and sulphat. It forms heavy stone, like ironstone-rock. *Ludus Helmontia*, and *Akerspire.*

4th. CLASS.—Lime is an alkaline earth, or oxyd of calcium. Saline stones are earth and acids, as are all limestones. They lose forty per cent. in weight of water and acids. By calcining or burning limestone or chalk, one ton will produce eleven and a quarter hundred-weight of lime: loss in calcination, eight hundred and three quarters. But in the common way of burning or calcining, the loss is but twenty-five per cent., i. e. five hundredweight; consequently, there is three hundred and three quarters unburned. Bishop Watson says, "Lime, in slacking, gains exactly as much weight, as it loses in burning:" hence the necessity of having the lime hot from the kilns, instead of being air-slacked; as three horses can draw as much hot lime, as four can of slacked.

5th. CLASS.—Magnesia is an alkaline earth, in a fine white powder. Magnesian limestone is found between Ripon and Doncaster. The upper strata is the best for land, and the lower bed is the best for masons; and is not unlike the freestone, or oolites of Portland Island, and Box-Hill, near Bath. These calcarious stones are mixed with lime, and have thence lost part of their fixed air, or carbonic gas; and on that account harden in the air. Air fixed in one inch of earth, is forty-three inches when rendered elastic by fire. The same quantity is found in hog's blood. In deer's horns, two hundred and thirty-four times its bulk. Heart of Oak, two hundred and sixteen times its bulk. In coals, three hundred times its bulk, or half its weight. And in iron-pyrites, eighty-three times its bulk. *(Vide Dr. Hales.)*

6th. CLASS.—Strontites is an alkaline earth.

7th. *Yttria*
8th. *Glucina*
9th. *Zirconia*
10th. *Jargonia*
Well baptized Jargon. Nondescript, farther than being alkaline earths.

I take it that some parts of these ten earths are combined in proper doses, with gases, by the assistance of filteration, evaporation, attraction, repulsion, &c. All other substances are formed as a precipitation or transition. Nature is shy in revealing her art of mixing. We are much indebted to chemists for what we do know of nature's wonderful works. They have thrown more light upon vegetation, fossils, and minerals, than all the herd of philosophers put together; who write merely from a happy knack of guessing, without the test of chemical proofs; and term most of the minerals alluvial, or mariene deposits, as coals from trees packed together by Noah's flood. Was sea-water stronger before the flood? or trees lighter? As we have no trees now, that, if cut and thrown into water, as soon as cut, will swim. Then, how could the trees of the old world swim with their roots and branches? We never meet with any of their old stubborn roots. In coal, the grain as well as fracture is always uniform. How happens it that coal is always upon a bed of hard stone, and invariably covered with a clay scale? It is evident that our Yorkshire coal is a transition coal, from clay marle, as may be seen in many places, in all its different states, from marle to coal, in the sides of hills, recently lowered for roads, between Leeds and Dewsbury, between Bradford and Leeds, between Halifax and Keighley, and many other places west.

Peat moss is said to become coal, which I am inclinable to believe, as I think all clays are of a vegetable production: at least such as are clay-marle, and are always the bed of peat; if it is not a clay-till. The sea is a convenient screen, as it covers all mineral productions they cannot account for. If coal was from the deposits of timber, How come black coal, and stone or canal coal to be in the same pit, as it is in Yorkshire? We are told also, that beds of salt are deposits of the sea, by its frequent flowings. How happens it, that the sea never leaves us any salt deposits now? Is it not as likely that the sea is brined from the land, as that every quality of the earth is under the marine influence? Is not the bed of the sea, land, as well as its shores? The sea is but one element, and of nearly one quality. Whereas I challenge all philosophers and land-tasters, to find one single square mile of land, that is uniformly of one quality. I believe the salt-rocks of Switzerland, those of Cheshire, and others, to be formed as coal is, viz. transition and rocks of all descriptions. There are stones of juvenile birth, bred and born on the surface of the earth, by the power of the sun and air, causing vapourous gases to rise, and no herbage on the mores to attract them. That the gaseous particles intermarry on hot summer days, on barren heaths. A good ear is saluted with the marriage ceremony, in little crackling sounds, on every side, as if stubble were burning: thus originate our small quartz, hunger stones, and fine white sand, which always accompany heath.

Heathy land, on a marley subsoil, forms our second class of good land, when inclosed, and vexed by the plough until subdued; viz. until the vegetable matter of black earth is decomposed and mixed with the marle again, that has been bred or generated by it.

No land is good without a mixture of marle, which some writers call animal substance; and where there is a deficiency, it is not to be made up by dead horses, but with clay marle. It is of various colours, as mottled soap, or marbled paper, with yellow, white, grey, blue, or red streaks. It admits of moisture freely, and when dry, crumbles into small fractures, exactly like the grain of coal. It abounds in all districts, particularly those of lime. It is yellow, with white or blue veins, in the magnesian and earthy lime district; and in the metallic limestone district, it is a brown-red, with grey veins, as South Devon, Dairy district of Cheshire, and Craven Hills, in Yorkshire. It is the best of dressing for thin, meagre, gravelly, or sandy land; yet, I never saw it, in all my travels, applied by any one but myself, and his Grace the Duke of Portland, for turnips. On his sandy land, where it abounds, there is not much vegetation, salt like, it is too powerful; and on that account, it is neglected as hungry stuff. This marle is by some called calcarious clay.

I regret that our industrious geologists and mineralogists have not, that I know of, given us a description of earths, properly arranged, so that an agriculturist, by reading, might identify the different earths upon his farm; so as to know how to prescribe manure and other auxiliaries, that may agree with the constitution of the soils. The fact is, it is too near the surface for either; yet it is my opinion, that most of the internal varieties, as deep as the sun, air, and water, have any influence, are principally goverened by this external coating of earth, assisted by internal fermentaceous gases, dry or moist, fiery or watery, sulphureous or ferruginous; as every substance the earth produces, when decomposed, becomes earth. Earthy limestone is chalk, as are all the chiltern or chalk hills of Cambridgeshire, Huntingdonshire, Bedfordshire, Hertfordshire, and Buckinghamshire; in which are the three chiltern hundreds, viz. Desborough, Stoke, and Burnham. Middlesex, Surry, part of Oxfordshire, Berkshire, and Wiltshire, Inland Counties, with the Maritine Counties, are Dorsetshire, Hampshire, Sussex, Kent, Essex, Suffolk, Norfolk, part of Lincolnshire, and the east-riding of Yorkshire. In all nineteen Counties.

It is Mr. Sutcliffe's opinion, that all the chalk districts were once limestone, reduced to chalk, alias carbonat of lime, by latent heat, causing the sulphuric and other acids to ascend through the ferruginous strata, which cause the changes, and sometimes take fire. This is saying a great deal in favour of transition.

If this be true, the ascension of his primitive fluids, with their kindred affinities, might be the cause of those gravelly shafts so often met with in the chalk-pits or quarries of Hertfordshire, as long and thick as the main mast of a ship. This metamorphosed limestone, by his fluoric acid, leaves the chalk, composed of lime, fifty-three parts; carbonic acids, forty-two; water, three; and alumine, two parts.

Clay or *Argil.* Argillaceous earths are known by their adhesion when wet. They are a mixture of argil and sand, or alumine and silica; and when mixed with carbonat of lime, magnesia, oxyds, &c. it becomes marle. Pipe-clay is well known. Middlesex clay, at Stamford Hill, as found in sinking a well, first six feet brick loam, then ninety feet of dark green micacous clay, then ten feet of clay, mixed colours, as red as blood, and as blue as indigo; under this was water, into which their pumps are let down.

Marle, is a mixture of carbonat of lime and clay: this is the true marle. All calcarious earths, are called marles; as chalk-marle, shell-marle, as are testaceous shells of fish and snails, egg-shells &c. are all lime; also petrifactions, stalactites, corals, &c, Mr. Maundrill says, "The river Adonis is, in the time of heavy rain, the colour of blood." By this hint, he has described the soil to be like South Devon; whose roads, in heavy rain, seem drenched in blood; by the red marle washing out of pulverised lime-stone; which is blue marble, alias Plymouth-rock: so much for the fable of Adonis' blood. It is my humble opinion, that all kinds of stone, salt, coal, &c., originate in a transition of marles: but clays never alter.

Stones of all descriptions, pulverised, become earth, or clay; as flints, slag, coalscale, lavas, limestone &c, decomposed by heat, air, and moisture; and the scrapings of roads, either dust or mud, are of all other composts, of the most generous nature. They strengthen the weak; sooth and warm the cold; subdue and open the stubborn clays; correct and prevent marsh lands and strong loams, from cracking, or baking. Westmorland slate, called *Schistose*, or clay slate, is from marle.

One foot of		*oz.*
Westmorland Slate, weighs		2767
Northamptonshire Slate, is calcarious grey rag		2592
Akerspire,	Iron stone	2808
Elland-Edge	Iron stone	3309
Welch slate		2876
Gurnsey Pebble		2999
Basaltes		2936
Toadstone		2921
Blue Rag, Mansfield,		2708
Granite, Aberdeen		2695
Shale or Crowstone		2681
Brown Quartz		2669
Black Pebbles, with red spots		2659
Welch Limestone Boulder, gathered in Bristol Channel		2651
Transparent White Quartz, out of Gravel Pits		2651
Opake White Quartz, out of Mansfield Sand Rock		2631

The difference between quartz and flint, is not in the colour; but quartz contains more silicious earth, less clay and calcarious matter, than flint. Bristol stone, is perhaps all silicious earth. Most sands are composed of particles of quartz and flint.

	oz.
Quartz, White, (with holes in) French Burstones	2399
Cellular Lava of which Millstones called Rhenish is a Brown dirty colour, and strikes fire like Flint	2277
Black Flint, (Dr. Watson,)	2592
White Flint	2400
Blue Whinstone	2760

This rock takes its name from Whinston village, in the county of Durham: it extends from Barnard-Castle, to Stockton upon Tees, forty miles: it is of a rusty iron colour, and when broke, is like new Iron. It lies in strata, exactly as Sussex Chalk, of three feet; with stratas of rubble, instead of flints. Whinstone and Scarborough chalk rock, are equally hard, and fracture, as flints.

Earthy Stone, better known by the appellation of Yorkshire Stone, 2432 ounces per foot. It is found on the hills, from Pennystone to Craven limestone; and between Bradford and Bakup, in Lancashire, under the slate and flagstone: the strata is cutting stuff, alias freestone. It polishes well, and is the handsomest stone this island produces. I have never met with it more than sixty feet deep; nor have I seen two quarries, whose stratification corresponded. They vary also in texture; as the surface soil varies as to loam, marle, sand, &c. This proves that Mr. Sutcliffe's idea of alluvial sediment, is absurd.

Gypsum, is lime and sulphuric acid, alias selenite, alias sulphat of lime. This is pure marle; and the purest is found in limestone caverns; refined by filtration, precipitation, &c.: and the clay is always found as a matrice thereto: so is rock salt, rock iron, and coal. The clay on coal, and Yorkshire pavior, is always a strong scaly cover; which when exposed to the weather, always becomes calcarious earth, and not clay. Gypsum, alabaster, or sulphat of lime, accompanies salt rock, in Cheshire; also the magnesian limestone of Yorkshire, Nottinghamshire, Staffordshire, and Gloucestershire. Mendip-Hills, in Somersetshire; the lime and gypsum is varigated blue, yellow, and flesh-colour.

Granite, formed by igneous fusion. Contradicted by Dr. Hutton; and proved to be a regular stratification. I have my doubts, as to any general stratification: nor is there much regular. I believe it to be a transition stone. It occurred to me, when in a fluoric cavern, at Matlock, that the whole mass was granite, in fluoric fusion. I felt convinced of it, the next day, by discovering a huge block by the road side; one end of which, was fluor, and the other perfect granite. The progressive transition, is by fluat of lime to fluor, &c.

Loams, most fertile, are in marshes; next are plains at the foot of sand-rock hills: as Bath, Batheaston, Warwick, Pontefract, &c. Always mixed with clay, that forms our fine silts, and warp-land. So uniform is the mixture of marles, sands, and clays, that no one ingredient can be detected, without washing and filtring.

Selenite; by some called talc; sulphat of lime, or gypsum. It abounds in Ploughgarlick-hill, near Depford. In cutting there, for the Surry canal, great quantities were found, in large masses, inbeded in clay marle. It was easily cleft into thin transparent laminas. Composition: acids, 46+lime, 33+water, 21=100.

Talc, resembles mica, or selinite; but the laminas are not flexible, and are dark coloured.

Sulphur; is the efficient cause of all mineral waters, crystallization, stones, coals, pebbles, ores, &c.; volcanos, burning mountains, lightnings, and meteors. When it meets with proper doses of other gaseous matter, to act in conjunction; it will ignite and explode.

Mould, or Vegetable Earth, is obtained from hollow willows, or any rotten timber, spray of trees, leaves, weeds, vegetables, rick, staddles, &c. But the richest, is farm yard manure, when rotted to mould. Peat and decomposed lavas, make the best earth.

Porphyry, or *Schistose*. At the east end of Malvern-hills, is flesh-coloured porphyry; some brown, others green felspar.

Schistose, or Argillaceous; alias clay-slate, horn-stone, welch-rag, blue, grey, purple, black, and ferruginous, or iron coloured slates.

Saline Stone; comprises every species of calcarious earth. In Lancashire, it is dark grey limestone, chalk, mountain milk; as at Winyard's Gap, Dorsetshire. At the boundary of chalk, westward; it has the appearance of whiting balls, in fusion. Blue lias, at Lyme Regis, and at Upway, in Dorsetshire, under the chalk; and I suspect there is statuary marble under the chalk at Flamborough-Head, Yorkshire. Wiltshire, Oxfordshire, Leicestershire, and Nottinghamshire, are magnesian limestones.

Tufa, is limestone rock; I have seen it in Northumberlandshire, like petrified sponge, honeycomb, old cable junk, &c.

Sulphat of Lime, alias gypsum.

Fluat of Lime, alias fluor.

Carbonat of Lime, alias saline stones.

Testaceous Limestone, alias tufa.

Saltpetre, formed in a bed of gravel, under the roots of horse-radish, at Bury St. Edmond's. DR. WATSON: "was this by sympathy or antipathy?" I once sent a four dozen hamper, from Stanstead, in Sussex, filled with venison, hares, pheasants, partridges, snipes, &c.; which was lost on its way to London, six weeks, in a damp place of Daniel Wise's, Horndean, Hants. When found, I was sent for to examine it; and found all right, except a rabbit; the rats had torn the entrails out of it, but it was sweet. B. Way, Esq. of Denham-Place, Bucks, partook of the said game, when dressed, who told me, he never tasted any game in finer order. Wh s. Lewis Way, ordered this game, being christmas time, she requested, that plenty of horse-radish might be sent with it. In packing the game, I strewed the horse-radish promiscuously; and to that I attribute the salvation of the game. Whether the putrid effluvia was attracted or repelled, I do not know.

Salt Rock Beds, of Cheshire; fracture, and grain, exactly as coal; also in depth and bed. Might not Mr. Sutcliffe as well say, this was the produce of alluvial white-wood; as coal is from wood. In his Introduction to Geology, he says, "Gypsous fluid from salt rock, ascends and generates." Gypsum, I am of opinion, it is *vise versa;* as coal, pyrites, and most other minerals, I suspect, are bred by filtration of water; which is the vehicle that carries down the principles of minerals, to the various substances or matrice of minerals; creating gases, that vitiates the various substances; so as to change them into stone, salt, coal, metallic ores, &c.

Argil, or Clay, is fullers earth, ochres, pipe-clay, &c. *(See Clay.)*

Serpentine, Steatite, and Soapstones; are composed of silicious earth, magnesia, oxyd of iron, and carbonat of lime. The Cornish Rock, at Lizard Point, is Serpentine.

Steatite, is grey and green uncious, as soap-stone. It is found in Cornwall also.

Schiller, stone, or spar; is dark green semimetallic, composed of silex, iron, alumina, and magnesia.

Marmorous Fluid, by its ascension, breeds marble. (See Mr. Sutcliffe's Pamphlet; for I do not understand his gypsous and marmorous, nor fluoric liquids.

Marble; is composed of carbonic acid, 48+lime, 31+ magnesia, 17+earth, 4=100. Another variety, is carbonat of lime 65+magnesia 35=100. Black marble is composed of lime 53.38,+carbonic acid 41.50,+carbon 0.75+ magnesia and manganese oxyd 0.12,+ oxyd of iron 0.25+ silica 1.13,+ sulphur 0.25,+ potash water and acids 2.25+

loss 0.37=100. Mr. Brand. Metalliferous limestone, is a marble, as Derbyshire, Devonshire, and Craven, in Yorkshire.

Trap-Rock, or Whinstone; includes greenstone, toad-stone, amigdaloid, and basalt; which is in appearance like volcanic lava; or slag, off an iron-furnace.

Greenstone; is hornblend, and felspar.

Hornblend; is a blackish green colour; it is of silicious and argillaceous earths; magnesia and oxyds of iron.

Felspar, or Moonstone; is of various colours: as brilliant blue, green, &c. It is used by jewellers. Mica, alias silica, alias siberian-glass.

Quartz, or Rock Crystal; is pure silicious earth: it forms veins in metallic limestone, hunger-stones, and sand on mores, in grit stones; semitransparent pebbles, in gravel, and sea-sand.

Chalcidonies, Agates, Flints, Jasper, &c.; are principally silicious earth, of a coarser sort, and coloured by metallic substances; of these, three agrigates: viz. felspar, quartz, &c: combined, forms granite, or synites, being found at Synite, in Egypt.

Quartz, or Spar in Rocks; is formed by the concretions of a limpid stream; as may be seen in slaty rocks. at Churchstone, Ambleside; at Plymouth rock, Devon.

Barrow-Hill lime is from a wynstone, or blue rock; weight, seventy-two pounds, per bushel.

Mountsorrel, is red whinstone.

Barrow lime is quarried at Burton upon Sour, on the east side of the river Wreke, and nearly level with it; over which is eight feet of marly loam; then one foot of farmer's limestone; then four feet of black scale; then seven feet of black limestone, in stratified lamina; (this is the best Barrow limestone for water-works.) At one mile south-east of Mountsorrel, the Barrow-Hill limestone is in Charlewood-Forest, Leicestershire.

At Bolden, on a hill, seven miles south of Newcastle, is the fish; and emptying itself into the River Aire, so contaminated the water, as to render it useless to the dyers, at Leeds, although thirty miles distance, and one thousand three hundred and sixty feet above sea level.

	Feet.
Thus the Canal, at Keighley is above the River Humber	362
Ponden Mill is above the Canal,	448
The Bog on Crow-Hill is above Ponden Mill,	550
Bog,	1360
Wolf Stones and Pendle Hill.	263
Total,	1623

The Summit of Boldsworth is a little higher.

On the 11th of September I surveyed the bog, which appeared to be a plain of fifty acres, surrounded by higher ground every where, except the head of Ponden Clough, where the eruption took place. The bog of peat-earth I found was quite rotten; and in some places, seven feet thick, saturated with water: over which, rested a coating of vegetable matter, not unlike spunge, in colour and texture.

It has been said by the public papers, that this eruption was caused by an earthquake. Others attribute it to that of a waterspout. It is my humble opinion, that the cause was by the weight of the sudden fall of rain, which had not time to filter through the super strata of spungy-like matter, of a yard thick; so that the superincumbent pressure caused the bog to burst at the weakest part; and disembogued many acres; by which the covering broke, (as the bog sunk,) and pieces as large as horses, were floated down with the liquid bog. At a mile north of the bog, is another rivulet; in which was such a flood, that it drove down two stone bridges thereon.

It seems strange, that the most elevated situations, should always produce the strongest springs, bogs, and peat beds: but on reflection, the cause seems obvious to me. It is well known, how the moisture of our breath is arches of bridges, like icicles; cornu amonis, or snake stones; as at Harrogate, Whitby, &c. Bolemnites, or thunder storms; as at Stockbridge, in Hampshire, and Preston, in Northamptonshire. Astroits, or starstones, in Northants, and Batcomb, in Dorsetshire. Oxfordshire, pyrites of iron, pyrite argentium, or silver firestone; pyrite aurius, or gold firestone, and gypsum; which when calcined to powder, is so powerful a manure, that it is said, three bushels is sufficient for an acre of land. I should suppose three tons better; as three bushels can be no more efficacious, than the *Old Nostrum Sympathetic Powder*. The quantity is too small: as is Mr. Clark's desiccated night-soil, spiced with coal ashes, and soot. Sold in Aldersgate Street, London; packed for sale in hogsheads.

This has been a long digression; nor can I dismiss it, without adding an account of a strange phenomina, that took place here, on Thursday, the 2nd of Sept. 1824. The thermometer, in a cool room, stood at 64°: the atmosphere dense and gloomy; the clouds in the west, at three o'clock, changed to the colour of new sheet copper; from which, issued most vivid lightning, with a tremendous single peal of thunder. The wind rose, and blew an hurricane, from the west, sweeping, not only dust, but sand and gravel clean off the road. The wind did not continue above five minutes. It seemed confined to the ground by the weight of the atmosphere. The moment the wind ceased, the dense atmosphere seemed to rush to the place where the lightning had been; as if it had been a vacuum: and the rain fell from four to six o'clock, as heavy as I ever saw in a summer thunder storm. I went out after the shower, and was surprised to hear a noise, like what is called a ground sea, in Dorsetshire. It was the flood, at the the bottom of my grounds; black as ink, carrying with it, stone walls within its reach, on each side the brook; choking up the water-wheels of mills, and factories: destroyed

CHAP. XXXVII.

ON PLANTING.

THE first plantations I ever saw made, (were done by Messrs. Perfects, of Pontefract, Nurserymen) for Thomas Thornhill Esq. of Fixby, Yorkshire, with two-feet Plants; holes opened promiscuously, a Plant dropped to each hole, and the planters had each a boy to hold the Plants upright for them. It was an elevated situation, thin soil, and near the rock; done in the years 1772 to 1774. They are now fine groves, upon a calcarious stone brash soil, elevated eight hundred and thirty-eight feet above sea level; but have been so injudiciously thinned, by always taking the best, that no estimation can be formed what size the different varieties would have now been, at fifty years' growth. There is scarcely any thing left besides Beech and Lime-trees.

In 1793, 1794, and 1795 I planted upon the highest down in Northamptonshire, i. e. Badby-down. It is such a calcarious soil as to require a pick-axe to dig the holes.

From one nursery I had the following:—

		£.	s.	d.
2000 Beech-trees, ...	2 feet high,	10	0	0
1000 Birch-trees, ...	3 ... do. ...	5	0	0
400 Broad-leaved Elms,	2 ... do. ...	3	12	6
300 Spruce-Firs, ...	2 ... do. ...	3	0	0
300 Scotch-Firs, ...	2 ... do. ...	1	10	0
300 Larch, ...	2 to 3 ... do. ...	2	5	0
600 Spanish Chesnuts, ...	2 ... do. ...	2	10	0
400 Horse Chesnuts,	3 to 4 ... do. ...	3	0	0
400 Hornbeams, ...	2 ... do. ...	1	12	0
100 Grafted Elms, ...	3 ... do. ...	1	0	0
5700 at one waggon load, ...		£32	9	6

Brought fourteen miles by Nurserymen's Team.

	£.	s.	d.	£	s.	d.
4000 Beech-trees, ... 2 feet high	29	3	4	17	0	0
1000 Spanish Chesnuts 2 ... do.	6	5	0	5	0	0
2000 Oaks .... 2 ... do.	12	10	0	5	0	0
500 Sycamores .... 2 ... do.	2	10	0	1	5	0
1500 Spruce Firs .... 2 ... do.	9	7	6	15	0	0
500 Elms and Hornbeams	4	3	4	1	12	6
1000 Birch-trees	6	5	0	3	15	0
40 Larch-trees	0	10	0	4	0	0
40 Weymouth Pines................................	0	13	4	0	16	0
20 Balm of Gillead Firs	0	6	8	0	12	4
400 Scotch Firs, 2 feet	3	6	8	2	0	0
11000 Total, in two loads, ...	£75	0	10	52	4	10

Delivered at ten miles distance.

1000 Oaks, 8 feet high, charged £50.; paid with £15. I agreed with the Nurseryman of the last bill to pay him the trade price. He made out his bill, as above, viz. £75 0 10; and was paid with £52 4 10.

The 1000 Oaks were to plant in Preston-wood.

Coventry, Nov. 25th, 1793.

Valentine Knightley, Esq. Dr.

To Whittingham & Were, Nurserymen.

	£.	s.	d.
1000 Grafted Elms, 3 feet high	7	10	0
1000 Spanish Chesnut	5	0	0
1000 Spruce-Firs, 2 feet high	7	10	0
2000 Scotch-Firs, do.	10	0	0
2000 Larch-trees	15	0	0
2000 Beech, 2 feet high	15	0	0
750 Lombardy Poplars	2	5	0
650 Horse Chesnuts	3	5	0
500 Limes	5	0	0
500 Wytch Elms, ...	1	5	0
11400	71	15	0

(Carried forward.)

		£.	s.	d.
(Brought forward.)				
11400		71	15	0
500	Sycamores	1	7	6
400	Weymouth Pines	6	0	0
200	Black Poplars	1	0	0
100	White do.	1	10	0
20	Black Spruce-Firs	0	6	8
20	American White Spruce-Firs	0	10	0
30	Balm of Gillead Firs	0	15	0
10	Hemlock Spruce-Firs	1	0	0
12680	Total, at three waggon-loads	84	4	2
10520	Home raised	51	1	6
11000		52	4	10
5700		32	9	6
39900	Trees	£220	0	0

Sent in by Whittingham and Were, at sixteen miles distance.

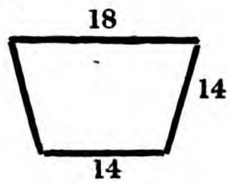
These Clumps were fenced in with posts, and two rails, underbanked, to keep out sheep. The dry or dotted line between the clumps is a grand grass terrace, which falls into a turnpike road, between two ample plantations. In 1817 I visited them, and found them better than I expected, upon such a dry and stony hill. The clumps are placed in a quincunx form, so as to cover the openings, and appear at a distance as one entire cover, to clothe the naked Down. But they had been thinned and pruned, by MR. PONTEY'S book, to naked stems, so that the design of cover was totally frustrated; and at a distance from either side, the light was seen through their naked stems, as if horribly grinning. I recommended lining each clump on the outside with more young plantations, to shut out the light, as per clump, marked A.

	Feet.
Canal, at Braunston Tunel, ...	389
Suppose the Down to be	211
Total, above the River Thames	600

All the tribe of Firs should not be less than two feet high, then their leaders will be out of the reach of hares, weeds, grass, &c.; and if much above two feet high, the winds have too much power on them. Oaks, Beech, Hornbeams, Limes, and Spanish Chesnuts must be none under two feet. All the others are of quicker growth, and will be from two to four feet high, at the prices, as per bills; and, being deciduous Plants, with single stems and shoots, they do not suffer by winds.

From 1796 to 1802, I was planting for F. I. Brown, Esq. of Frampton, Dorsetshire. In 1795, there had been some acres planted at the foot of a chalk-down, which admitted of ploughing; and had been trench ploughed, viz. ploughed two furrows deep, by going twice in a place in each furrow. This was not practicable higher up, by reason of the substrata being hard rock, of a grey chalk, with no more than three or four inches deep of staple, or surface earth: a discouraging circumstance; but my hopes were supported by the knowledge of Plants loving to have their roots near the surface; so that they can but support themselves against winds. They will not overgrow their support, but make their annual shoots in proportion to the progress of their roots.

Having staked out the lines for the boundary fences, of the inclosure, and made foot-banks, all of surface earth and floor ditches, (see article fences,) and planted the quick, I then looked over the nursery, and by counting all the Plants of each variety, fit to plant out, making a memorandum as I proceeded, how many of each sort I had; then adding them up together, I knew how many holes to open for their reception. I got a frame made, eighteen inches long at the top, fourteen at the bottom, and fourteen deep, as per figure.

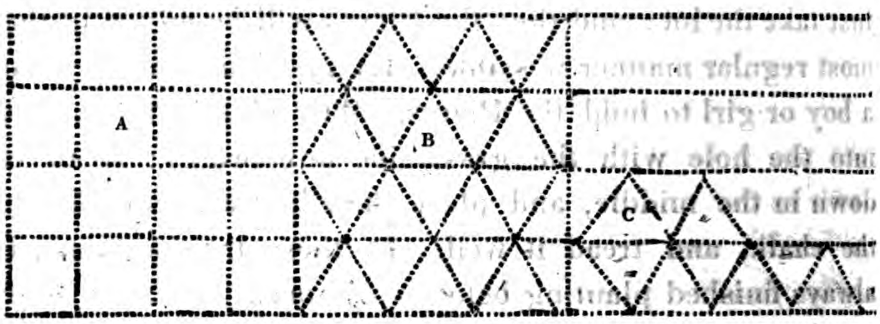


This was the gage by which the men were to open the holes. Each man was provided with an iron crow-bar, instead of a pick-axe, steel-pointed and spear-shaped, in order to penetrate the hard chalk. I let the holes opening at two shillings and six-pence per hundred. Daily wages were then eighteen-pence per day. In opening the holes, the whole eighteen inches' clod was taken up entire, and laid upon the chalk that was dug out of the last opened hole; and so proceeding until the number of holes wanted was opened, without any respect to form or distance, save or except keeping six or seven feet from the banks of the fences, and filling the ground as full of holes as possible. The stuff raised out of the holes covered the interspaces so thick, that the men wanted no other guide for their distances, but that of filling the ground as full of holes as possible; and that is from seventeen to eighteen hundred per acre. Having a waggon in the nursery, and beginning, by the list of trees taken, with the greatest number first; they being loaded, go on to the second greatest number of trees; and so on until the whole quantity is drawn and loaded: and when they are gotten to the place for planting, unload each variety separate. A man with a light bill-hook must trim the deciduous Plants, shorten the straggling roots and over-long tap-roots; but not to meddle with the roots of Firs. Then begin with the smallest number, distributing them all over the ground; and so proceed with each variety, separate, to the last which was first drawn and loaded: it being the largest in number and the last lot. Every hole found without a Plant will just take the lot; and thus the Plants will be mixed in the most regular manner possible. Every planter must have a boy or girl to hold the Plants. The clot is to be put into the hole with the grass-side downwards: tread it down in the middle, and place the Plant thereon: fill in the chalk, and tread it well. In these dry situations, I always finished planting before christmas. In March or April, when the vernal equinoctial gales are over, let a man, with a spade, go over the plantation, put the earth or chalk to rights, and tread them firmly, particularly on the east side: thus they are done with for fourteen years, in any land. But on these hills, they want neither thinning nor pruning for twenty years. A little attention to keep the leading shoots of the deciduous trees in order, by checking the laterals every four or five years. The first signal for pruning, will be the Fir leaves of the bottom of the shoots getting brown. The signal for thinning, will be when the deciduous trees begin to suffer, by the Firs overgrowing them. These mixed plantations are the most difficult of all others to manage well; therefore, much art and care are required in thinning and shortening all the rude laterals, to keep up a due competition with all the varieties.

Much has been written by theorists, about the form or position of Plants in plantations, as quincunx, straight lines, regularly, irregular, &c.

Any thing like lines in woods and plantations is disgusting to the eye, except sides of rides. There is but one way of planting, to look well, and that is the simple, random, or promiscuous way, as described in the opening holes for the last plantation.

That my rustic reader may understand what is meant by the above terms, the following sketch will explain :—



A. is inadmissible; even two of the lines for an avenue do not look well. Theseȇ are parallel squares. B. is the quincunx or hexagonal form, as is C. Two of the lines are extended as an avenue, and are infinitely handsomer than squares, as A. The side of a square acre is 208 feet 8 inches, and $\frac{88}{100}$ parts, or nearly 70 yards. And an acre, set out in square parallel lines, as A. at 5 feet distances, would take 1733 trees. An acre, set out in quincunx order, as at B. at 5 feet distances, would take 2243 trees per acre. The diagonal lines being as 8 is to 7 of parallel squares.

It seems almost paradoxical how a plantation could thrive, when let into a chalk rock, as above stated. The surface being hard, most of the rain, that falls in summer, runs off into the holes, and waters the roots, so as to keep them alive. Their annual shoots are but short for three or four years, until they have furnished themselves with roots near the surface; then they shoot two feet annually, or more.

Roots of trees, when interrupted in their progress by hard substances, act like the antennæ or feelers, as horns of snails and other insects, forced by the expansion of sap, in spring, over hard substances, across ditches, &c.: thus these unfortunate trees extend their roots in the surface clot, until they get up to the surface earth.

Roots of trees will always go down, where there is no substrata to oppose them, as deep as the sun and air have any influence on vegetation, and no deeper; nor will they swell much there: hence it is that tap-roots are never found under old trees; for, as they go down, they produce lateral roots near the surface, which enjoy the benefit of the sun and aerial food, so as soon to outgrow the tap-root, which then ceases to grow; and the tree keeps progressively swelling, until it gets large enough to exclude the sun and air from the central part, where the tap-root originally was; and then decomposition takes place, by reason of moisture; and this is, in other situations, called dry rot: hence old trees becoming hollow. Thus time and exposure decompose and reduce to earth again, not only wood, but stones, flints, slags, iron, and even glass and brass are subject to decay. Dr. Watson says, "They are dephlosticated by the action of water and air." They attract water and fixed air, that loosen their adhesion. This decomposition arises from their containing calcarious earth in a caustic state, or manganese; for these will gradually attract water and fixed air; and then swell, burst, and loosen the whole texture of the substance: as we see bricks that contain lime; on the contrary, mortar hardens by long exposure to the air: hence the utility of paint. The paint should be adapted to the pores of the wood, stone, or metals. From or by this decomposition, a question naturally arises, What is earth? answer, Mr. Evelyn says, "Sand is the ground of all earths." The clamminess of it being rather something extrinsical and accidental to it, than any thing natural and originally constitutive for the combination of these several moulds or earths, which gives the slippiness and diverse temper, seems rather to be caused by the perpetual and successive rotting of grass, leaves, branches, and moss, in a long tract of time, have amassed together, a substance heterogeneous to the ruder particles, which after the dilutions of the superficies (that is of the rich and fatter mould) appears to be little other than sand or fixed salts, of various figures and colours; since even the most obdurate and flinty pebbles, beaten and ground to powder; and by calcination, reduced to an impalpable powder, is as fine to the eye, and smooth to the touch, as the most smetic earths and marles themslves. This proves that all kinds of substances are composed of earth and fixed air.

In 1803, I did some business for George Brooks, Esq., of Houghton-Hall, near Shiffnal, Shropshire. Amongst the rest, was making a screen plantation against Shrewsbury road. The soil was a good sandy loam. I had it trenched eighteen inches deep, at eighteen-pence per rod. The Plants were brought from Perry-Hill nursery, near Birmingham.

In 1817, I visited the same plantation, and was surprised to find the Plants as if they had gotten to their full growth; no appearance of conic heads, but ramified into the form of old full grown trees. On examination, I found they had made better shoots the first seven years, than they did afterwards. I attributed the cause to trenching. Like Bunyan's Pilgrim, they had lost their way, by sending their roots down into the trenched ground, out of the influence of the sun and air, which is always the case with trees planted upon new trenched ground: besides, the Plants have always a propensity to settle faster than the surface earth, so that the coarcture gets deeper than the roots aught to be. Vegetation is promoted by heat, which puts the sap in motion, by expanding it. It then pushes forward both roots and shoots, which are much retarded by the roots being buried too deep.

The mean heat of our climate is forty-eight degrees, and at ten feet within the earth all the year round. Any depth nearer the surface, is under the influence of the sun: hence porous soils producing taller trees than clay or loamy soils, that cannot furnish such a regular supply of warmth, nor evaporation. The roots, as well as branches, find the effect, as there is a reciprocal affinity between one and the other. Oak will thrive on clays, if laid dry. Trenching of clay land causes it to admit rain, and return it in vapour for two or three years only. Where there is an absolute necessity of trenching clays for Shrubs and Firs, they should be qualified by mixing sand. The scrapings of turnpike roads will subdue the most stubborn clays, if properly mixed, instead of been carelessly thrown into the bottom of the trenches: nor by any means plant within twelve months after trenching, for fear of the roots getting too deep for enjoying the genial influence of the sun, air, and dews.

In 1816, I visited the chalk-rock plantations, in Dorset. They were as tall as those on the Shropshire good land, feathered to the ground, vigorous and healthy, with conic heads spiring up delightful to behold: and the Shiffnal plantation, as described before, with ramified heads and ten feet naked stems, were no thicker than those on chalk-rock, owing to overgrowing themselves at first.

I examined the Firs minutely, in Dorsetshire, and found they had made shoots the first year after planting, four inches long; second year, five inches; third, eight inches; fourth, twelve inches; fifth, fifteen inches; sixth, sixteen inches; and the seventh, twenty-four inches: This had been the average of the shoots ever since; and they were twenty-four inches in circumference. The deciduous trees were sixteen inches in circumference, at the bottom, when sixteen years old, and were from twenty-seven to thirty feet high, fully equal to Shiffnal plantation in height. The upper end of the part that was trench-ploughed, although eighteen years old, was no better; but the lower end, at the foot of the hill, near Sydling River, was thirty-four feet high, and thirty-six inches in circumference, at the ground. These comparisons prove that the growth of trees planted, depends more upon the planter than the earth they are planted in: hence it is, that Seedlings have the advantage of never being too deep. The coarcture i always in the right place, viz. level with the earth's surfa

It has been proved, (page 141,) that trees are fed by the

MR. EVELYN tells us, (page 29,) of a table eighteen feet long, and nine feet broad, in one plank of Cedar. Another table, out of a limb of the same tree, six feet by five, and three inches thick. It grew in the chink of a rock, in Barbadoes. I found this corroborated at Kirkstall Abbey, near Leeds, on the 29th of April, 1824, upon walls, thirty or forty feet high, Brambles and Briers, fine bushy Thorns, Elder and Ash trees, with stems eighteen inches in circumference, Ash and Broad-leaved English Elms, growing in rubbish on floors, to the height of seventy or eighty feet, with bark as smooth as Beech: one of which I measured, at six feet from the ground, was thirteen feet in circumference. Buffan says, "Genius is an aptitude to patience." Patience, with persevering application, resisting all motives that divert, will expand the natural faculties of the mind; and capacity, study, and application, give us a facility in conceiving things in a true light. Our forest arborators or surveyors of woods should be disciplined in the forests, and not as court administrators, upon the treasury bench; nor will books do, without practice. Repertories and Magazines are but common place books. Other periodical works, such as Bath Agricultural Reports, and the Board of Arts, Manufactures, and Commerce, give us accounts of extensive plantations being made; but they do not inform us how, nor in what manner the plants were prepared; nor how put in. MR. PONTEY gives a very clear account of his mode of planting, in his Profitable Planter; but it is only applicable to mountainous districts, being only two years' old Seedlings, let into holes made by a hand pick-axe. I think if they were transplanted one year before planting, they would have a better chance: the Firs then would be a foot high. The Dorsetshire plantations were raised in three acres of nursery on the estate, and produced from fifteen to twenty thousand two feet Plants, annually. The same nursery might have produced three times as many, if they had been taken out when the Spruce and Silver-Firs were only one foot high; the Scotch-Fir one foot and a half; and the Larch two feet of the same age. There is another way. I have seen Oaks, Beech, Elms, &c. drawn out of seedbeds, at two feet high, to be mixed with Firs. The Plants are dropped where they are to be planted: the planter moves backward, making a cut with the spade, as |; then a second, by treading down the spade, makes the upright notch into a square, as _|; then pulling the handle of the spade violently, raises the clot in the angle, so as to admit of the Plant being thrust in. This slovenly mode is cheap and expeditious; and by the facility, there is generally more planted, by double the quantity, than there aught to be: the consequence is, the necessity of thinning at seven years old, instead of fourteen. On all good estates, there aught to be a corner of ground allowed for the training of trees, to plant out as single trees, from twelve to fifteen feet high; and where there is a park, there should be a nursery for the purpose, and never suffered to grow more than four years without moving; and then they will go out with good roots, and may be twenty feet high, with from seven to ten feet clean stems; and by lightening their heads into a pyramidal form, preserving the leading shoots; and never attempt to prune them afterwards.

Notwithstanding all that has been written on pruning trees in parks, to long naked stems, it will be as easy to make a true judge of park scenery believe them handsome, as to make a picture-frame maker believe that a drawing room, hung with pictures without frames, is handsome.

The varieties of trees to be thus trained are as follow:—

1st. Elms.—2nd. Oaks.—3rd. Beech.—4th. Plane-trees. —5th. Sycamores.—6th. Spanish Chesnuts.—7th. Horse Chesnuts.—8th. Lime-trees.

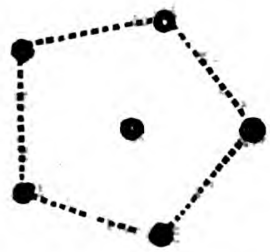
When single trees are dotted out, instead of digging a deep hole, only dig just deep enough to admit of the roots; then mark out a ring, three feet round the tree, and dig a trench, width of a spade, on the outside, placing the clots turf-side outwards, all round the tree, filling the middle with earth from the bottom of the trench. This is called tumping. It supports the tree against winds, without stakes and bandages, and slighter guards; keeps cattle off. If the ground be wet, place the roots upon the turf, and tump as above.

Then for groups. Two trees will not group together. A tripod group of three trees, from fifteen to twenty feet distance, will look much better than small clumps thus planted :—

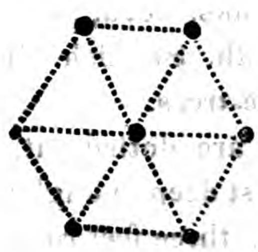
Four do not group well, except by planting one tree in the middle of the triangle.

Five trees group well in a quadrangle, thus :—

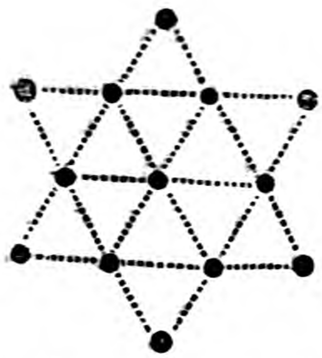
Six trees form a beautiful group, in a pentagon, by placing one tree in the centre, thus :—



Hexagon requires seven trees, thus :—



A double hexagon may be formed of two triangles, for thirteen trees, thus:—



For any larger number of trees, planting at random is preferable to any geometrical figure.

Such groups as these, at forty years old, will look very different to clumps closely planted, of the same age, whose naked stems disfigure the scenery.

Never mix two sorts in the same figure. Here are five varieties of figures, and eight sorts of Plants, which will give forty changes; and to enrich the scenery, introduce some clumps of Firs, (as none of the Fir tribe bears shifting well, after they are two or three feet high, they must be fenced in as clumps,) but do not mix them.

1*st*. *Pinus Cedrus*, or Cedar of Lebanon.

2*nd*. *Pinus Pinaster*, Cluster Pine; leaves six inches long.

3*rd*. *Pinus Cembra*, or Stone-Pine, or Almug-tree.

4*th*. *Pinus Strobus*, or Weymouth-Pine.

5*th*. *Pinus Sylvestris*, Spanish, alias Scotch-Fir.

6*th*. *Pinus Picea*, or Silver Fir.

7*th*. *Pinus Abies*, or Norway-Spruce.

8*th*. *Pinus Larix*, or Larch-tree.

In order to guard against naked stemmed trees, in these clumps, plant your trees at from fifteen to twenty feet apart also, and fill up the interspaces with such trees and shrubs as cannot get up to annoy them; as Thorns, Hazel, Maples, Dogwoods, Elder, Laurels, Privets, &c. Near the mansion should be single trees of Cork, Evergreen Oaks, Holly-leaved Evergreen Oaks, Lucomb Oaks, Walnut-trees, Hemlock Spruce Firs, Hop Hornbeam, &c.

I measured an Evergreen Oak, at Colonel Brereton's, at Chichester, in 1816. It was planted by himself, in 1766. The stem was seven feet high, and seven and a half in circumference. Another at Wilton-House, the seat of the Earl of Pembroke, ten feet in circumference; and Cedars of Lebanon, from fifteen to sixteen feet in circumference. Goodwood Park Lodge, near Chichester, is covered by a screen of Evergreen Oaks, in the form of a square or ell, ten feet thick, and thirty feet high. In the park, are Silver-Firs, Spruce and Larch-Firs, which were fifty-six years old in 1816, eighty feet high, and seven feet in circumference, at four feet high; diameter of heads, thirty-four feet. At the front of the house, are hedges of Sweet Bay, Common and Variegated Hollies, mixed with Evergreen Oaks, thirty feet high.

At Sion-House, Duke of Northumberland's, is an Elm, one hundred feet high, sixteen feet in circumference, and begirt with Ivy to the top. Its stem is two feet round. Lime-trees, one hundred feet high; Poplars, one hundred and thirty feet high; Mossy-cupped Oaks, Scarlet Oaks, Lucomb and Evergreen Oaks, Laurus, Sasafras, Iron-wood, Nettle-tree, Deciduous Cypress, Sugar and Striped Barked Maples, Yew-trees, &c. from thirty to sixty feet high. These are rare specimens of what time and care will do; and are living monuments of the noble Duke's ancestor's good taste.

Thistlewort and Twickenham, are famous for first-rate Elms and Arbeels.

In Richmond-Park, are Beech groves, planted in lines each way, sixteen feet apart, eighty feet high, and stems from four to six feet in circumference. Some are dead for want of thinning. Here are some first-rate Oaks, sixty feet apart, and stems ten feet in circumference. Others forty feet apart, and stems seven and a half feet in circumference: these are datas for quantity per acre. In Chelsea Physic Gardens, are some good things; one Liquid Amber tree, has fifty cube feet of timber in it.

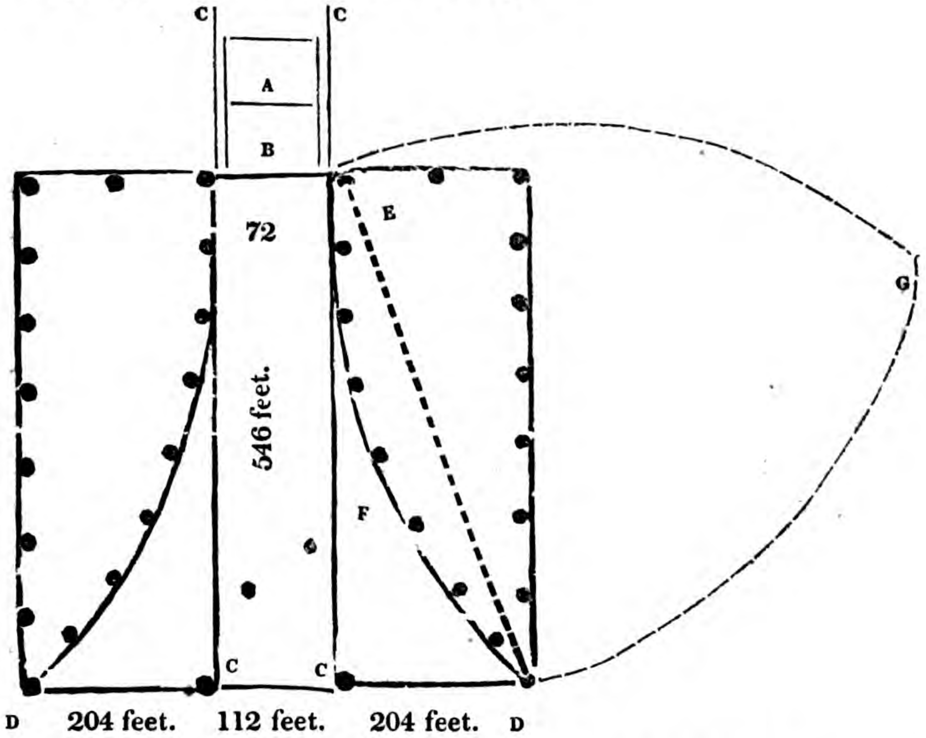
In Kensington Gardens, there is a Huntingdonshire Willow, thirty feet clean stem, and ten feet and a half circumference: also a Common Maple, forty feet high: Hollies, Ironwood, Sir Charles Wager's Maple, Variegated Hollies, and Yews of the first quality. Scotch Firs stop at twenty feet shorter than Lime trees. At the front of Greenhouse, there are eleven Larches, from fifty to sixty feet apart, and their lateral shoots touch each other. South of the Bason, is a Wood of Ash, Elm, Oak, Lime, Spanish Chesnut, &c. eighty to ninety feet high; two thirds of which want thinning out. In the Park, are some first rate Elms. At Harrow on the Hill, are some first rate Sycamores, Arbeels, and Elms.

This is a long digression: let us return to Park ornamental planting; having finished dotted-tree and clump-planting, with such precautions for clear stems, and distances of trees, as will ensure their feathering themselves as near the ground, as the brousing of cattle will admit of, by their lateral branches; which are as necessary to the beauty of trees in Park scenery, as frames are to pictures; or else the Park will not be picturesque

Lines of trees and avenues are not fashionable now; yet, they are very beautiful and pleasant to the mind, when the place for them is judiciously chosen. Single lines of trees always look well near a fence. Two lines so situated are beautiful; and when near the mansion, are delightful to saunter in, when hot weather; and for exercise, in frosty weather. In planting such Grove-walks, you are not tied to width, as in avenues; but if they are less than twenty feet wide, their lateral branches will not keep alive as low down as they aught to do, between the rows; and forty feet wide is not too much, if five hundred feet long. Lime trees make their heads too formal for single trees; but in groups, beautiful: and for grove-walks most desirable, on account of their sweet smelling flowers.

Straight lines of trees and avenues in the interior of a park, always seem to be a division of it; and have a mean appearance from either end, when the eye is admitted outside the lines: therefore inadmissible, unless cut through a wood, or a large grove planted for the purpose; and in a large park, would be the greatest luxury that ever were introduced, by a landscape gardener; if near the mansion, but never in front. It should be wide enough to admit of dot-planting on each side, not in lines, nor nearer together than twenty feet. Double-blossomed Common and Scarlet Thorns, Liquid Amber, Bay-tree, Purple and Fern-leaved Beech, Tree-Box, Cedar of Lebanon, Red Cedar, Cypress upright and deciduous, Arbor Vitæ, Hollies Common and Variegated, Snow-ball Tree, Evergreen Oaks, Cork Tree, Liburnum, Maples in variety, Oleaster, Portugal and Common Laurels, Atheophrasti or White Beam, Arbutus Teakwood, Ironwood, Tulip Tree, and Yew Tree: all allowed to grow on grass-borders in their natural state; thus you would have forty or fifty varieties that are rarely met with of any size: for in planting shrubberries, all are crowded together so thick, that in a few years they destroy each other. These rare Shrubs, should always have a place on the shrubberry-lawns.

On the road side, between Brighton and London, near Reygate, and on the right hand, is a sham castle, placed upon the Surry ridge of hills, with plantations on each side the castle, diverging down the face of Chalk-down, so as to leave the front open; as if arms were extended to receive those who approach it. There is something like it, in front of the Rectory-house, Kildwick, Yorkshire. It struck me forcibly, that something of the sort might be introduced to the fronts of gentlemen's seats, to wonderful advantage and the improvement of their appearance, by curvilinear rows of trees, where the mansion was not too far from the entrance; or where there might be a grove or group of trees to run the lines to; and even should there be neither, groups might be planted for the purpose, when the character of the house and grounds would admit of such: also to park lodges, and other ornamental buildings. I was so much pleased with the effect it had on me, that I adapted it in front of my own house, at Oldfield, near Keighley, in Yorkshire; as per plan.



A. is the house; B. is the fore-court; C. C. C. C. is two parallel lines drawn to the bottom of the meadow, and twenty feet from the house on each side, to prevent the trees ultimately intercepting light or prospect. From C. measure off to the desired point D. Draw the line D. E. and with that radius describe the equilateral spherical triangle; and the line D. F. E. is the curve line for trees: then proceed in the same manner for the other side. This rule will answer for any length and width; and will ensure a graceful sweep. All the round dots represent trees.

The situation is on the north side of a valley a mile wide; it hangs to the sun to an angle of ten and a half degrees, and is much admired from the south side. The trees in diverging lines, are twenty-five feet apart. This will seem thick planting in a meadow; but let it be remembered, we want shelter, being at the foot of the mores, and one thousand and twenty-two feet above the sea. Our trees will never arrive to half the size of those grown in low vales and southern counties.

Belt or screen plantations are generally planted without any attention to their ultimate use or beauty; and just the same as common plantations: all sorts and varieties are huddled in together. So it is with clump-planting. Capability Brown was the father of them: since his time they have been neglected as to thinning, and are become mere skeletons, all over the kingdom; and as unsightly as pictures without frames.

In page 218, I have compared the progress of trees planted on bad land, without trenching; and on good land, trenched: the result is evident, and the loss by trenching and deep planting, incalculable. Nor is any preparation for forest trees of any use to them: for in twenty years, those planted without any preparation, besides simply opening the holes and planting; will overtake those that have been prepared. Proved as follows:

"The Strowd or Tucker-field, at Frampton, Dorset, is upon a substrata of chalk, but had the advantage of both soil and situation to those in page 213. Prior to being planted, the field was fallowed, manured, and sown with turnip-seed. The turnips were eaten by sheep, which was a second manuring; and then planted in the autumn of 1796. In 1816, the best Firs measured thirty-two inches circumference, at the ground: so that with all their advantages, they had but about two years' growth advantage of those of White-Hill, and the two Barrow Plantations."

Such preparations cause the young trees to thrive vigorously for some years at first, and the planter has credit. No more is thought of them, but all is well; their debility is seldom detected for want of such experimental comparisons being on record: and if they are detected, the cause is always attributed to the soil. (See pages 200 and 220, for application;) which expands the ideas, that enable us to find means to obtain the object: as Dr. Grew says, "Means used are as various as men's minds, as to sense and genius of considering men." A mean will be found, that will be approved of by all men; therefore all means should be tried, and no means superficially rejected.

Quincunx, alias quincuna, or the hexagonal form of planting in plain English is, to plant the trees in lines, so as to form equiangled and equilateral triangles: and the irregularly irregular, alias random, alias promiscuous planting forms angles obtuse and accute, with unequal sides, near enough to quincunx, and much handsomer than if they stood in rank and file, as Hop-gardens.

Having dispensed with these trammels and proved trenching a nuisance, on account of roots loving to be near the surface, which proves at the same time, that their roots aught not to be molested by cropping their intervals; we will now proceed with the belt or screen. The width to be proportioned to circumstances, and well fenced in, say fifty feet wide, with a ten-feet road through the middle. If chalk, or other calcarious soil, plant Hazel, with a few Thorns, Hollies, Maples, and Mountain Ash. If loam, or clay soil, plant Oak and Elm with Grey Withies, for Coppice; and by never copsing, or cutting both sides of the road at the same time, it will always be a complete screen and cover for game. Against the outer fence may be planted a line of Lombardy Poplars, at from ten to fifteen feet distances, whose shade will not much incommode the Copse. And on the outside of the inner fence, dotted trees, at from thirty to fifty feet distances, not in a line, but varying so as not to be nearer the belt than ten feet, nor farther off than twenty feet. If there are no trained trees, as those for tump planting, (page 221,) trees may be drawn out of other plantations of ten or twelve years old for the purpose. This kind of belt has the most magnificient appearance in an extensive park, of any thing I ever saw. Screens, near home, should be all Shrubs, planted at a good distance, without Firs or deciduous trees.

Shelter for Plantations. Upon all mores and elevated downs, begin planting on the west side, for, from the west comes the mischief. If the ground is dry, plant ten feet wide, with Sycamores, Beech, and Horse Chesnuts, but never any Firs, as they never stand long, besides they grow with such conic heads, as to afford no shelter where it is wanted, viz. at the tops. It is not cold that injures plantations, but the violent winds which distress and strain the young shoots whilst in a tender herbaceous state in spring. If the ground is wet, plant Broad-leaved Elm, Oak, and Alder, for shelter; then proceed with any or all sorts, duly prepared from the nursery, advancing annually eastward; and by these means, the most elevated situations may be clothed. I never saw young shoots killed by spring frosts, for they will not come forth until forced by warm weather. The reason of Sycamores making the best shelter is, because their shoots break forth so stiff, that they resist all winds.

Shelter for cattle should always be Coppice-wood, with Hollies; and before it is grown, so as to become open at the bottom, cut down half, and in four or five years that will be got up so, that the other half may be cut. Thus by alternately copsing, there will be a perpetual shelter. The Hollies, as in the belt, are never to be cut. By no means ever admit of Firs, as they always get naked at the bottom, totally defeat the purpose they were intended for, and become conductors of cold winds to the very place they were intended to protect, by their heads impeding the winds, and forcing them down between their naked stems, with more violence, than if no trees were planted there.

Mixed plantations, of all others, are the most unprofitable, when composed of a general mixture, which is generally the case: and, as Firs are more conspicuous than others, also easier obtained, care is taken to have plenty of them. It unfortunately happens, that they are the quickest growers; by which, all the others are oppressed; and under which, no Plants can thrive: no, nor animals, humane or brute, can thrive under oppression. There are many plantations, I have lately observed with regret, of a new mixture, more mischievous in their tendancy and unsightly than Firs: that is, the Caralina Black Poplars, four or five of each sort, mixed, per acre, look very well; but the Poplars, Aspins, and Arbeels, should, in general, be confined to the valleys and cloughs; and there they may all be mixed. I have seen a plantation in the richest of vale land. When only eight or ten years old, the Poplars had got the ascendancy so much, that every other variety had given in, so that the gentleman has nothing to look at but Poplars from his windows, instead of variegated scenery.

CHAP. XXXVIII.

PRUNING.

"WHEN ripening time has made your trees dilate,
And the strong roots do deeply penetrate;
All the superfluous branches must be fell'd,
Lest the oppressed trunk should chance to yield
Under the weight, and so its spirits loose
In such extreme branches, but as for those
Which from the stock you cut, they better thrive,
As if their ruin caused them to revive."

Evelyn.

The season for pruning is, from the fall of the leaves to February; after that, the sap gets into its watery fusion; and as the warmth increases, it ferments. (This is called the bleeding season.) It is this fermentation that breaks open the buds and pushes up the shoots. Any one, conversant in pruning, must have noticed the watery fusion, by the weeping of Sycamores and Plane-trees, lopped in spring; and housewives tapping Birches for wine: this never kills the tree, but an annual ring of wood is lost thereby.

Pruning-saws should be made like those called gentlemen's saws, fourteen inches long, of steel, with only four teeth per inch. If they are finer, they cannot be set wide enough to clear themselves from gumming. There should be one or two, whose teeth are nine in two inches, without handle, and a heel riveted thereto, like the heel of a scythe, standing straight out, and fastened to handles, six feet long, with a hoop and wedge. This will facilitate the work by precluding a ladder. In the first pruning, prune all the Firs first, fagot up the prunings, and carry them out, and then you will see better what to do with the deciduous trees. Most of the trees make a swell at the place where the branches shoot from, and that is the place to cut the branches off at, and not close to the tree. The wound will be less, and healed by the time the tree is swelled up to them Some will object to letting plantations get from fourteen to twenty years old before pruning, on account of knots, and retarding their growth: but, as to their knots, when the trees are full grown and converted into boards, they will not be discovered any way but by the plane, being a little curled in the grain: and as to retarding the growth, I believe, if an acre of the same plantation was carefully knife-pruned all the time, that the neglected part would have thirty per cent. more wood in them, than those close pruned, besides the loss of prunings. (See page 61.)

We often err for want of experience, as in the case of trenching comparison, (page 219.) There should be as few thinned out this time, as possible; yet it will be found expedient to fell some Firs, in order to relieve some favourites that are oppressed by them. The number thus cut, will be from fifty to eighty per acre. From them, will come about two and a half fagots each; and the pruning fagots will be four or five hundred. The Expense will be thirty per cent. on the produce of poles and fagots. To attempt giving any estimate of the ultimate produce, would be mere idle, speculative theory, founded on probabilities, without a parallel case, prior to planting. If the planter were to take a cross-staff to the centre of the ground, to be planted, and set out two lines, intersecting each other, so as to point to the four cardinal points, and plant them with Aspens, Arbeels, and Poplars, mixed, they would have a pleasing effect, when grown up, and would always be a guide to know the nearest way out for carrying poles and fagots.

The mode of mixing all sorts of trees, in plantations, is so prevalent, that I doubt, if any thing short of absolutely superintending their training, would convince superficial observers of the absurdity of the practice of general mixtures. Particular mixtures would variegate the scenery, much more pleasing to the eye, and be far more profitable. Thus, place the Scotch and Spruce Firs all together; then Sycamores, Ash, and Horse-Chesnut-trees in another group, or groups, according to the magnitude of the plantation; then all the other varieties may be mixed in the usual way, as there is a near affinity in their growths, (Poplars excepted.)

Thinning plantations will be required five or six years after the pruning, and, as there will be no Underwood, the whole may be gone over annually, until the trees are at a proper distance to stand for grove timber; and that distance will be from one-third to half their height; and, at each thinning, prune them up to half their height:

thus, they will have ample heads to swell their stems.

CHAP. XXXIX.

ON COPSING.

OZIER-BED, per acre, at four years old.

	Labour. £.	s.	d.	Produce. £.	s.	d.
Weeding 4 years, at 3*s*.	0	12	0	0	0	0
Cutting the Willows,	0	15	0	0	0	0
Making 46 dozens and a half of herdles, at 2*s*.	4	13	0	18	12	0
160 Dozens of doles or herdle-stakes, at 2*d*. ...	1	6	8	6	0	0
800 Nickies, pimps, or kindlers, at 1*s*. 4*d*. ...	0	10	8	2	0	0
2000 Thatcher's Ledgers, at 2*s*. 6*d*.	0	5	0	1	10	0
40000 Thatcher's Spars, at 1*s*.	2	0	0	5	0	0
	£10	2	4	33	2	0

This was in Dorsetshire.

These herdles are only used for fence herdles, upon fence banks. The wood is too soft to be pitched as sheep-fold herdles.

Ninety-five Ash-poles, drawn out of a Coppice, produced four hundred and seventy-five feet, viz. five feet meetings, or five feet average per tree, which

	£.	s.	d.
Sold at 3*s*. per foot,	71	10	0
Top and lop, sold to the same person, at 10 per cent, ...	7	3	0

One hundred and eighty-four Beech-poles, drawn out of the same Coppice, produced one thousand and seventeen feet and a half, or five and a half feet meetings, which

	£.	s.	d.
Sold at 9*d*. per foot,	38	3	0
Top and lop, at 12 per cent	4	11	11½
	121	7	11½

(Carried up.)

					£.	s.	d.
(Brought up.)					121	7	11½
Felling the above Ash and Beech-poles, at 1*s*. 6*d*. per load, ...	2	5	2				
Underwood of the same Coppice.							
8288 Bavins, making and withs, at 2*s*. 9*d*. ...	11	7	11	sold	31	1	7
460 Fagots, at 2*s*. 9*d*. or 2*s*. 6*d*. and withs 3*d*....	0	12	7½	do.	4	16	9½
20750 Herdle-rods, at 2*d*. per 100, ...	1	14	7	do.	25	18	9
39 Dozens of Herdle-stakes at 2*d*.	0	6	6	do.	1	19	0
Labour, ...	16	6	9½				
Gross produce, ...					185	4	1
					16	6	9½
Nett produce from eight acres, ...					£168	17	3½

And left Plants enough to form a good Oak grove, fifteen feet high. (Hams-Copse, Stanstead, Sussex.) This gives nearly nine per cent. for labour on produce.

There should be a nursery on all wooded estates, for Copse-wood Plants, to fill up all vacancies, the autumn after copsing; but where the Cops are cleared in time, plant immediately, otherwise the old Stools get one year's start of the young Plants.

> "From planting new, and lopping aged trees,
> The prudent ancients bid us never cease;
> Thus, no decay is in our forests known,
> But in their honour, we preserve our own.
> Thus, in your fields, a sudden race will rise,
> Which, in your nurseries, will yield supplies,
> That may, again, some drooping grove renew,
> For trees, like men, have their succession too."
>
> *Evelyn.*

Beech-Grove. (See page 100.) Fifty years old, and eighty feet high. One hundred trees, cut, produced one thousand four hundred and forty-six feet of timber, in stems, up to six inches square, which sold at seven pounds ten shillings per hundred feet; and the tops produced one thousand one hundred and fifty-five feet, which prove that nearly one half was only fit to cleave into rails, or for pit-props: but as we had no market for either, I had them cut into cord-wood. They produced twenty-three cords of wood, which prove that a cord of such straight stuff contains fifty cube feet, which, at twenty-five shillings a cord, is six-pence per foot cube, for fuel.

It has often occurred to me, that the gentlemen of Norfolk, Suffolk, Wilts, and Dorset, have been very remiss in not planting Beech plantations upon their chalk-downs, in the imitation of Sussex and Bucks. And they might mix Larch therewith, as they thrive admirably together, and would form noble groves, in twenty years.

> "In such green palaces, the first Kings reign'd,
> Slept in their shades, and angels entertain'd;
> With such old counsellors, they did advise,
> And, by frequenting sacred groves, grew wise:
> Free from the impediments of light and noise,
> Man, thus retir'd, his nobler thoughts employ'd."
>
> *Waller.*

The Duke of Richmond was one of our greatest planters, in the eighteenth century. He was too good a judge to mix the deciduous and Fir-trees together. He had seen the Fir-forests in Sweden, Denmark, and Russia. He planted his Firs about five feet apart, and never pruned or thinned them, until they were forty feet high. He then drew out the worst, leaving the best to grown into timber.

I have seen his thinnings in Goodwood-park, as handsome poles, spars, and barge men's stours, as ever came from the Baltic, and as little tapering.

Beech-woods, thinned in Buckinghamshire, forty years old, and sold for fences, in Middlesex.

Rails, cleft nine feet long; average weight, twelve pounds; so that a load of four hundred will weigh two tons, two hundred-weight, three quarters, and twelve pounds.

	Labour. £.	s.	d.	Value. £.	s.	d.
100 Fence-posts, cutting and cleaving, ...	0	4	2	0	19	0
100 Rails, ... do. .... do.	0	3	4	0	12	0
100 Rail-stakes, ... do. .... do.	0	2	1	0	6	0
Expense, ...	0	9	7	1	17	0

Felling the trees are included, and the labourer has the chips.

CHAP. XL.

ON FELLING TIMBER.

TWENTY rough single Beech-trees, felled, produced one thousand six hundred and seventy-seven feet, which

	Labour. £.	s.	d.	Sold for. £.	s.	d.
Sold at £6. per 100 feet, felling at 3*s*. per 100,	2	10	4	100	12	4½
36 Cords of two feet billets, at 4*s*. per cord ...	7	8	10½	39	15	7½
1000 Bavins, at 2*s*. 9*d*.	1	8	10½	5	5	0
	£11	7	1	145	13	0

These twenty trees were 83 feet meetings.

Fifty-nine Beech-trees, produced six thousand nine hundred and seventy-three feet and a half, viz. one hundred and eighteen feet meetings, which

	Labour. £.	s.	d.	Sold for. £.	s.	d.
Sold at £10. per 100 feet, felling at 3*s*. per 100,	10	5	6	697	7	0
60¼ Cords of wood, at 2*s*. 6*d*. cording, ...	7	10	7½	63	5	3
625 Fagots, at 2*s*. 8*d*. making, ...	0	17	2	6	11	3
3563 Bavins, at 2*s*. 8*d*. do. per 100, ...	4	18	1	17	16	3½
9 Trees lopping, before felling, ...	0	9	0	0	0	0
	£24	0	4½	784	19	9

Expense, a little more than 3 per cent.

Five prime Beech-trees produced four hundred and forty-three feet, viz. eighty-eight feet meetings, which

	Labour.			Sold for.		
	£.	s.	d.	£.	s.	d.
Sold at £11. 5s. per 100 feet, felling 3s. per 100,	0	13	6	55	7	6
3¼ Cords of wood, at 2s. 6d. cording,	0	9	4½	3	15	9
425 Bavins making, at 2s. 9d. per 100,	0	12	8	2	4	4¾
50 Fagots do. at 1s. 4½d.	0	1	4½	0	10	6
	£1	16	11	61	17	1½

Per cent. for labour as above.

Twelve Beech-trees produced one thousand four hundred and eighty feet, viz. one hundred and twenty feet meetings, which

	Labour.			Sold for.		
	£.	s.	d.	£.	s.	d.
Sold at £8. per 100, felling at 3s. per 100,	2	4	4½	118	8	0
17 Cords, of two feet billets, at 5s. cording,	4	5	0	19	19	6
2⅝ Cords, of four feet billets, at 2s. 6d. do.	0	6	6½	2	15	2¼
25 Fagots, at 2s. 9d.	0	0	8¼	0	5	3
988 Bavins, at 2s. 9d.	2	5	0	5	3	9
	£9	1	7½	146	11	8¼

Per cent. £6. for labour.

Beech-mast is ripe in October, and very plentiful in chalk districts. A gallon of the seed weighs nearly five pounds, and contains seven thousand three hundred seeds. (See page 37.)

CHAP. XLI.

ON OAKWOODS.

IF sown, bring the land to a good tilth, as for turnips; and in November, whilst the acorns are fresh from the trees, as they do not keep well, dibble them in, in lines across the lands, as farmers plant beans, taking two or three lands at a time; lines two feet apart, and acorns nine inches apart, in lines, and not more than two inches deep. Each acorn will have one foot and a half of land, or twenty-nine thousand and forty Plants, per acre. One gallon of acorns, weight nine pounds, containing one thousand two hundred acorns, will be just three bushels per acre: which is quite sufficient on good land.

Mr. Law says, in his Nottinghamshire Agricultural Review, "That their practice, in the sandy part of Sherwood Forest, is to grub the heath and furze to burn; then plough, and take two crops of lentcorn; then turnips, to be eaten off early; then trench-ploughed, and sown with five bushels of acorns, four bushels of Ash Keys, one bushel of Spanish Chesnuts, and one bushel of Haws; afterwards, double harrow the ground, and plant two thousand Plants, of mixed varieties of Forest-tree Seedlings, from six to eighteen inches high." This, I consider an extravagant system. I cannot see any good that can arise from the Hawthorns: and as Ash Keys lie in the ground eighteen months before they vegetate, it would be better to plant than sow. Beech-mast also is the best, when sown in the seminary, where it can be protected from the frost, by which it is liable to be killed; its seed-leaf being very succulent.

Where extensive plantations for woods, are intended to be carried on annually, I would recommend establishing a nursery for the purpose, as being cheaper and much less trouble. And for woods, I would admit of no mixture with Oak, but Spanish Chesnut, and that only in very dry land. The Plants should be removed every two or three years, at farthest; which will be the means of destroying the tap-root, and encouraging the laterals, so that they are sure to thrive when planted out of the nursery. This maxim will apply to Cedars of Lebanon, Silver Firs, and others that are so difficult to remove with success.

A nursery of one acre, will produce twenty thousand deciduous Tree-Plants annually, as they do not require so much room as Firs. Lines, twelve inches apart, and six inches in line, is sufficient room for the last transplanting.

In planting a wood, I would choose the dryest and most elevated place, for a clump of Yew-trees, not less than forty feet diameter, to be planted with two or three rows of Hollies all around it, to be allowed to run up to timber. They should be transplanted in the nursery every third year, to get well rooted, until they are two or three feet high; and then they will be sure to thrive when transported into the wood.

Fountain Abbey, near Studley-Park, Yorkshire, was founded in 1132. It is on record, that some Yew-trees were there prior to its being founded. One of them is now twenty-six feet and a half in circumference, at three feet above the ground. It is a fair inference to say, "If planted as above, they would rise to be equal in height to any Oak, with clean stems." What is the value, or what purposes they might be converted to of the most advantage, is not known. The Hollies, also, would be drawn up into stately trees.

Transplanting Seedling-Firs, by women, at eight-pence per thousand. Drawing Seedling Thorn-Plants and Beeches, two years old, by men, at six-pence per thousand, to be transplanted. Seedling Hornbeams, six-pence for drawing, and eight-pence for transplanting. Drawing Plants, digging and planting lines, one foot apart, and six inches apart in lines, fourteen-pence per rod. Drawing Plants from one foot lines, digging the ground, and planting in lines, two feet apart, and nine inches apart in lines, ten-pence per rod statute. Plain digging in the nursery, four-pence per rod. Plain digging, between two feet lines, called turning in, three-pence per rod. Plain digging, between one foot lines, (day's wages one shilling and six-pence,) four-pence per rod.

Seedling Oak Coppices, alias Maiden-woods, should be thinned the first time, at fifteen feet high. If they are allowed to run up higher, they will not swell their stems, but grow top-heavy, which checks, not only their future growth, but injures the succeeding crop of Underwood, which is to be the most valuable ever to be expected. The young Oaks should now be left at six or seven feet apart, which will be about one thousand two hundred per acre. Each acre on seventy, averaged two thousand five hundred bavins, which cost three pounds eight shillings and ninepence per acre; produce, at twelve shillings per hundred, fifteen pounds. The woodmen will do all the pruning required now, for their own convenience. These bavins weighed from thirty to fifty pounds; average, forty pounds, viz. thirty-five hundred-weight per hundred. For labour on goods, there is almost twenty-three per centum, on account of the bad markets, in the west of Sussex, to convert the produce to better purposes than fuel.

The above goods grew upon land, valued at fifteen shillings per acre.

	NAMES OF GOODS.	Length. Feet.	Girth. Inches.	Weight. lbs.	Cutting per hundred.		Value per hundred.		Quantity per acre.	Expense per acre.			Value per acre.			Weight per acre.			
					s.	d.	s.	d.		£.	s.	d.	£.	s.	d.	Ts.	cwt.	qrs.	lbs.
1	Herdle Poles.	15	...	2000	1	6	18	-	650	-	9	9	5	17	6	5	16	-	8
2	Long Stakes, ...	8	30	800	-	2	6	-	78	-	13	-	2	18	6	1	15	2	14
3	Five feet Stakes, ...	5	37	340	-	2	3	-	48	-	8	-	1	16	-	-	8	3	10
4	Herdle Stakes, ...	4	36	170	-	2	1	6	58	-	9	8	2	3	6	5	-	2	9
5	Herdle Rods, ...	10	34	140	-	2	-	9	67	-	11	2	2	10	3	3	9	2	16
6	Fagot Bands, ...	4	47	80	-	2	-	9	50	-	8	4	1	18	6	1	15	2	26
7	Great Withs, ...	9	38	90	-	2	-	9	18	-	3	-	-	13	6	2	4	-	2
8	Small or short Withs, ...	6	34	45	-	2	-	9	16	-	2	8	-	12	-	3	14	3	8
9	Broomsticks, ...	4	42	220	-	2	1	6	11	-	1	10	-	8	3	-	14	1	24
10	Birch Kids, ...	6	72	180	-	0½	1	-	11	-	-	11	-	11	-	-	6	1	20
11	Fagots, ...	4	54	3500	2	4	18	-	319	-	7	6	2	7	8	-	9	3	1
12	Arbor Poles.	10	...	130	-	2	-	9	14	-	2	4	-	10	6	-	16	1	-
13	Thorn Fagots, ...	...	...	......	......		......		87	3	18	2	22	7	2	26	2	0	26

This was a thirteen years' growth.

No. 1. averages twenty pounds each, in weight. No. 2, eight bundles per hundred. No. 3, four bundles per hundred. No. 4, two bundles per hundred. N. B. These are the uprights in wattle-herdles. No. 5, one bundle per hundred. No. 6, one bundle per hundred. No. 7, one bundle. No. 8, one bundle. No. 9, two bundles. No. 10, two bundles. No. 11, Fagots per hundred. No. 12, props for cloths; lines fourteen dozens. No. 1, in some places, would be hop-poles.

This was an old wood, reduced to a coppice of thirteen years' growth, twenty feet high, consisting of Oak, Ash, Cherry, Birch, Withy, and Hazel. Labour here, was seventeen per cent., on account of it being mere Coppice-wood, and no Oak-poles for bark; they being allowed to stand for timber trees.

These goods grew in Buckinghamshire, upon land, worth twenty-five shillings per acre.

Another acre, measured off, and goods weighed, upon the same estate, as above. It was then ten years growth, and very good.

	Ts.	*cwt.*	*qrs.*	*lbs.*
278 Herdle-poles, from 10 to 15 feet; weight 20 lbs. ..	2	9	2	16
70 Bundles, long stakes, 8 feet for bar-herdles, ...	2	19	1	14
23 do. 5 feet stakes, 4 bundles per 100, ...	0	17	0	11
37 do. 4 feet, for warp of wattle-herdles, 85 lbs.	1	8	0	9
75 do. 10 feet, weft of do. 100; weight 140 lbs.	4	13	3	0
24 do. 4 feet, fagot-bands, to besom makers 80,	0	17	0	16
22 do. 9 feet, long withs, 90 lbs. per 100, ...	0	17	2	10
17 do. 6 feet, short withs, 45 lbs. per 100, ...	0	6	2	9
20 do. 4 feet, broomsticks, 220 lbs. per 100, ...	0	19	2	16
27 do. Birch kids, 90 lbs. each, ...	1	1	2	22
203 Fagots, 35 lbs. each, ...	3	3	1	21
22 Dozens of Arbor-poles; weight 130 lbs. per dozen	1	5	2	4
Total weight per acre, ...	20	19	2	4

Oak-saplings, thinned, fit only for herdle-poles.

	£.	s.	d.
2700, at £1. per hundred, ...	27	0	0
Produced 283 yards of bark, which sold for	33	0	0
700 Lop and top fagots, sold for	7	0	0
	67	0	0

(Carried up.)

(Brought up.)				£.	s.	d.
				67	0	0
Cutting the poles, at 1*s*. 6*d*. per hundred, ...	2	0	6			
Stripping the bark, at 7*d*. per yard, ...	8	5	1			
Making 700 fagots, at 2*s*. 8*d*.	0	18	8			
				11	4	3
				£55	15	9

This herdle-pole bark is generally called white bark, and will weigh about twenty-five pounds per yard, as set to dry on pole in range; or eighty-eight yards per ton, when dry; and sells at half the price of timber bark. In shaving and hatching for the tanner, it will lose one hundred-weight in a ton.

The above is Buckinghamshire bark, cut three feet long, and set double in range.

No specific time can be ascertained for the second thinning, on account of the difference of the soil and situation, which will vary the growths, from seven to fourteen years; but in all situations, when the trees are twenty-five feet high, the thinning may be done. Forty of these Saplings will contain fifty feet of wood, and produce a load of two feet bark. Sixty yards, at twelve pounds per yard, viz. six hundred-weight and a half of bark to every fifty feet of pole, round measure. N. B. This is the second thinning.

The next thinning is, when the trees are about forty feet high, which are called flitterans. Twenty-four of these trees will measure fifty feet, and produce ninety yards of bark, at sixteen pounds per yard, viz. twelve hundred-weight and three quarters to every fifty feet of wood. This flitteran bark is worth three pounds a load, on pole of sixty yards, when timber bark is worth four pounds. These trees may be pruned up now to twenty feet clean stems. In some land, they will not grow above ten or fifteen feet higher: in others, forty to fifty feet. But in all soils and situations, nothing more is required, but thinning occasionally, so as to prevent their heads interfering with each other; for, I repeat it, that if they have not room to form good heads, they will not swell their stems as they aught to do: nor will the bark be so heavy by one-third.

Oak-woods, neglected, have thin bark, and bad heads, by standing too thick; and when thinned, will be some years before they recover: then, the cause is attributed to letting in the cold. The trees push out small shoots all up the stems, through the thin, elastic, blanched bark. The cause of their breaking out is, by letting in light, sun, and air, which cause the parenchyma to expand in an unusual manner; and for want of fuller heads to receive it, it breaks out through the blanched bark: nor can the stem swell any more, until the heads are recovered. Peel a young healthy tree all round, two or three inches, and it will break out shoots under the peeled part, but will not swell the stem. The stem above the peeled part will swell; and the next spring, the head will produce weak shoots, and die. The new head will shoot vigorously, and swell the stem below; which proves, that the sap is supplied from the earth by the bark. It also proves, that the wood is produced by fermentation and aerial matter, collected by the leaves.

I once marked twenty trees, of forty years old, all different varieties, measured their circumferences, at four feet above the ground, entered their girths in a journal, and measured them once a month for a year. Cedar of Lebanon began to swell in May; so did the Beech and Scotch Fir; but the other seventeen varieties did not swell until June: nor did any of them swell after the frosts injured their leaves in autumn. This proves, that the concentric annual rings of wood are produced in the course of five months in our climate: and their growths, in quantity, must be governed by the elevation of the latitude, as well as the elevation of the hills.

The above twenty trees grew at Stanstead, Sussex, two hundred feet above sea level. In Yorkshire, two hundred and fifty miles farther north, and eight hundred feet higher than Stanstead trees, I had some Alders raised from seed, in the spring of 1819: and in autumn, I had some Arbeel Cuttings planted. In the spring of the year 1821, I planted them in good land, well sheltered from the north and west winds: and, in the spring of 1824, I put a ring of white paint round some of the best, at nine inches above the ground, as a mark to find them by, and to measure them at.

		Circumference.			
	1st. June, ...	4	inches and	6	parts.
	1st. July, ...	5	do.	0	
	1st. August, ...	5	do.	5	tenths.
	1st. September,	6	do.	5	do.
	1st. October,...	6	do.	64	
1825. Very growing May,	1st. May, ...	6	do.	64	
	1st. June, ...	6	do.	75	
	1st. July, ...	7	do.	75	
	1st. August, ...	8	do.	40	
	1st. September,	9	do.	0	
	1st. October,...	9	do.	0	

These trees are now thirteen feet high, with ample heads, unpruned, and have plenty of room.

Birch and Pine are humble Shrubs, at the altitude of ten thousand eight hundred feet, on the Island of Madagascar.

There are Plants on the Adam's Peak, Island of Ceylon, six thousand four hundred feet: at Dauphiny, in France, nine thousand: and on the Alps, ten thousand feet above the sea.

Our tallest trees are always found in valleys, or large thick covers, where evaporation and aerial food can ascend the highest; by which, the altitude of our trees are governed.

I have above stated, that the sapling, alias white bark, sells at half the price of timber bark. This is when sold by measure on the pole. When sold by weight, it is worth as much as any other bark; as there is no loss in hatching above one hundred in a ton; and flitterans, one hundred-weight, two quarters, and seventeen pounds.

Trees of five feet meetings, or ten trees to a load of timber, will produce sixty yards of bark: weight, eight hundred and forty pounds.

Trees of ten feet meetings, or five trees per load, will produce sixty yards of bark: weight, nine hundred and sixty pounds.

Trees of fifteen feet meetings; a load of which, will produce sixty yards of bark: weight, one thousand one hundred and forty pounds.

Trees of twenty-five feet meetings, or two trees per load, will produce sixty yards of bark: weight, one thousand three hundred and twenty pounds.

Trees of thirty-seven feet meetings; a load will produce sixty yards of bark: weight, one thousand four hundred and forty pounds.

Trees of fifty feet meetings, will produce only sixty yards of bark: weight, one thousand six hundred and twenty pounds.

All these trees sold at the same price per load; which proves the absurdity of selling bark by measure. This was Sussex cut; and it loses in hatching, three hundred-weight out of a ton. Forty-five hundred-weight of hatched bark is a London load: and the bark from coarse, single trees, six hundred-weight or more per ton will be shaved off as crutt or waste in hatching.

Bark, in Sussex, cut twenty-five inches long, and when ranged, sixty yards are a load, which costs twelve shillings and four-pence half-penny stripping and setting up. The four-pence half-penny is in lieu of carrying home wood.

Seventy-one feet of green bark, opened flat and close piled, set sixty yards. It was from grove timber of from twenty to fifty feet meetings, and weighed eight hundred-weight, three quarters and fourteen pounds; and when dry, it weighed five hundred-weight, three quarters, and twenty-six pounds: loss in drying, two hundred-weight, three quarters, and sixteen pounds. It came from seventy-one feet of timber, so that a cube foot of timber will produce a cube foot of loose bark.

Four cube yards of dry bark, from flitterans. One load of sixty yards, housed, weighed six hundred weight, three quarters, and sixteen pounds. It was kept housed for one year; in which time, it lost twelve pounds: and when hatched, it weighed five hundred-weight, three quarters and seven pounds: loss in hatching, three quarters, and twenty-five pounds.

One load, or sixty yards of smaller flitteran bark, dried and piled, measured four cube yards also. It was housed one year; in which time, it gained forty-two pounds, and lost, in hatching, two quarters, and one pound: it then weighed five hundred-weight, two quarters, and fourteen pounds.

In the mountainous part of Yorkshire, the woods are upon a small scale. Their prices for felling Oak are, from one shilling, to one and eight-pence in the pound, on the timber price; and three shillings and six-pence a pack for peeling, or one pound twelve shillings and sixpence per ton. Price to tanners, one pound per pack, or nine guineas per ton. The charcoal burners have five shillings a cord for cording the wood; being a coal district, there is no fagotting.

Charcoal. One hundred and sixty-two cube feet of Cordwood will produce seventy-two bushels, strike measure: weight, six hundred and a half, viz. ten pounds per bushel.

In Sussex, one hundred of Oak lop fagots will weigh two tons and a half; price, one pound one shilling. One hundred Oak lop bavins will weigh thirty-five hundred-weight; price, twelve shillings. Oak lop Cordwood, cut four feet long; and, on account of being crooked, it piles hollow. A cord will weigh thirty-four hundred-weight:

cording, two shillings and sixpence: sells in the woods at one guinea.

A clean butt of Oak, thirty-seven inches long and forty-eight round: value, four shillings and ten-pence per foot, —fourteen shillings and six-pence. It produced six bundles of heart-laths, and two bundles of sap-laths: cost eight shillings rending: heart-laths at six shillings per bundle: sap-laths, four shillings, sale price.

	£.	s.	d.
6 Bundles of heart-laths, at 6*s*.	1	16	0
2 do. of sap-laths, at 4*s*. per bundle,	0	8	0
	2	4	0
Value of 3 feet of Oak, ... £0 14 6; Lath-rending 8 bundles, at 1*s*. £0 8 0	1	2	6
Profit,	£1	1	6

Herdles, wattled for sheep folding, when worth ten shillings per dozen, the rods are worth two shillings and four-pence per hundred, thus,

	£.	s.	d.
275 Rods to a dozen herdles, in Sussex,	0	6	3
Cutting at 4*d*. per 100,	0	0	11
Making per dozen,	0	3	6
	0	10	8
Sparwood for thatchers and spray-bavins,	0	0	8
	£0	10	0

As each herdle contains two superficial yards, any wattle-work or fleik may be valued, and the number that will be wanted known; as two hundred and seventy-five rods make twenty-four yards of herdles. The rods are cut so stout, that the upright stakes are cut out of them.

Three thousand five hundred rods made one hundred and twenty-eight herdles, viz. one hundred rods to four herdles. They were strong ones, worth twelve shillings per dozen.

Herdles, fresh made, will weigh from twenty-eight to thirty-three pounds. A load is ten dozens, viz. one hundred and twenty, at twenty-eight pounds, are one ton and a half: and one hundred and twenty, at thirty-three pounds, are one ton and fifteen hundred-weight.

Herdle-stakes, or doles in wood, are one shilling per dozen. Herdle-fences, setting up, pointing the stakes, and tying herdles to them, one penny per rod. One acre of good Hazel Coppice will produce three loads of herdles with stakes.

Welch, or bar-herdles, seven feet four inches long, six bars in three feet, heads five feet long, one upright in the middle, and two braces, cost, making, six-pence half-penny each, and sell for two shillings each.

Common welch-herdles, for sheep, only five bars, sell for one shilling and six-pence each. They are made from Copse-wood, as page 243. The long poles of eight feet, are cleft for bars, herdle-poles for heads, &c.

Bar-herdles. Bars, for deer-parks, should be cleft three quarters of an inch thick; and for gates, one inch on the thick edge. They are much cheaper than sawn bars, and stronger, on account of the grain not being crossed by sawing.

In the Lincolnshire Agricultural Report, there is a statement of Sir Joseph Banks' wood's produce, annually, for thirty-two years: each annual cut, twenty-three years' growth. It is the only statement of regularity I have met with; but it falsifies itself. It says, "The Oak timber is weeded out in proportion of one-fourth." It calculates on four succeeding growths being ninety-two years, and on inferior land, one hundred and fifteeen years; and when cut, of five growths, produced per acre, as follows:—

	£.	s.	d.
20 Oaks, averaging 22*s*.	22	0	0
Bark,	11	0	0
Poles,	10	6	8
Brushwood,	2	0	4
There is no statement of expenses.	£45	7	0

Is it possible, that twenty Oak trees, of one hundred and fifteen years, or ninety-two, can be worth no more than twenty-two shillings each? Naked timber; or tops, lop, and Underwood from an acre, is worth no more than two pounds and four-pence: or, Is it wise to let Underwood stand twenty-three years? Perhaps it is to bilk the Rector of his tithe. If the woods were copsed at fourteen years' growth, they would be more valuable; and the produce put out on interest, at five per cent. during the growth of the next fourteen years, would be accumulated to ninety pounds; which, added to the next cut, would be one hundred and thirty-five pounds for twenty-eight years. It is an exaggerated statement; and as erroneous, as the old barbarous Springwood system is rediculous and absurd. If the above statement be correct, it is evident, that the Seedling Oaks are so much injured by being drawn up in a twenty-three years' growth, that they never recover to a free growth. They are truly named Wavers. Forty-five pounds seven shillings, for twenty-three years, are one pound nineteen shillings and five-pence per acre, per annum. This is evidently garbled; because the statement goes on, and gives an average from eight hundred and five acres:—thirty-two years, one pound eight shillings and eight-pence per acre, per annum. This, he compares with copses, in general, throughout the kingdom, at fifteen shillings per acre. I hope he allowed this to be a nett return of fifteen shillings. I wish we had more comparisons. See page 222, for a nett return of one pound nine shillings and eleven-pence, for a thirteen years' growth.

In 1819, at Denham Place, the seat of Benjamin Way, Esquire, Buckinghamshire, he gave up the old system of running Beechwoods and Oak Springwoods; and entirely adapted the grove system: and the same wood that gave twenty-nine shillings and eleven-pence, gave, at the same time, one thousand five hundred stout, healthy Seedling Oaks, from ten to fifteen feet high, which form a beautiful young grove at once; and will produce a plentiful crop of Underwood, for two fourteen years' cuts; and after that, dwindle away: as a healthy grove, of forty years old, admits of nothing like Underwood thriving in it. Its canopy enjoys the monopoly, in majestic rusticity; and is awfully grand to behold from beneath.

To reduce a part of a forest or holt, or old Springwood, to the grove system: such holts and woods consist of trees of all ages; having had none drawn out but the oldest or best; many of which, are cripples by oppression, or by their forefathers falling upon them: hence our shaken timber; also by carters drawing their carriages over the Wavers or Saplings, for want of roads. On surveying such woods, if you find, that there is not enough of young for a crop, cut down the whole.

It is a fact, not generally attended to, that the surface of the earth, in all thick covers, is destitute of vegetation: hence it is, that old woods, cut down, always make better young woods, than can be raised by seeds or planting, without going to an enormous expense. Practice proves, that seeds, which fall spontaneously, and those dropped by birds, lie where they fall, until they are picked up by hogs, pheasants, &c. or else rot, which they will not do for several years. This is proved by such cut-down woods always producing a superabundance of Seedlings, in great variety; and more abundant, than all the seed that ripened for a year or two thereon, preceding the fall. Fence in the woods secure from the cattle; and, in October, (twelve months after,) examine them carefully, to see if there be any places deficient in Seedlings: if such be found, plant acorns, not with a setting dibble, but a small pick, just deep enough to be out of the sight of rooks: also, keep hogs out; and, in ten or twelve years, they will want copsing. Most of the old stools will have disappeared; and those which were young enough to produce shoots, it will be found, that such stammer or stool shoots are of no other value, than for fagots; the Seedlings being preferable. When there are Plants enough, of a young and healthy appearance, in an old wood, of equal size, take out all the largest, crooked and crippled; and all the smallest with the Underwood; then you will have a beautiful young grove at once, that will flourish. Young and old cattle never winter well together in the straw-yard: nor will young and old timber, growing together, be so profitable to the owner, by thirty per centum, as if properly arranged: thus, by the grove system, as regular a succession of timber and Underwood may be obtained, as by the old Springwood system. When an old grove is ripe, fence it well in, two or three years prior to the felling, and it will produce a young Coppice: but if it be desirable to change the scenery, grub up all the trees by the roots, which may be done at one-third of the expense that attaches to felling the timber, and grubbing out the stools afterwards. People, not used to grubbing, never take room enough, namely, they always begin too near the tree, or stool; by which, they have not room to work, so as to get under the stool. A good set of grubbing tools consists of a spade, pick-axe, mattock, alias grub-axe, beetle, wedges of wood and iron, levers, iron crow-bar, blasting-pin, auger, and a cutter eighten inches long, with a bolt head; the other end like a felling axe, to be driven down between the wedges, to cut the cross-grain in the clefts. With these tools, any root may be grubbed, at six shillings per stack, of one hundred and eight cube feet, viz. $12 \times 3 \times 3 = 108$, and nothing to be stacked that is above six inches diameter.

Enough has been written on perpetual or Springwoods to satisfy any unprejudiced gentleman, that the grove system is infinitely preferable; as they are generally Oak.

"The Oak is held royal,
'Tis Britain's great boast,
Preserv'd once our King,
And will always our Coast." *(Shakespeare's Jubilee.)*

I am not lost in the wood; I leave it with reluctance, for fear of tiring my readers, and recommend the second Volume of Mr. Farey's Derbyshire Report. It is a valuable work, principally on woods.

Running woods are of Beech. It is a heterogeneous term; never baptized by reason. Its gender was from a fool's egg; hatched by ignoranee and avarice, that copsed the Beech plantation; not knowing that Beech had such compact bark; that the parenchyma is never able to push any lateral shoots through it, when cut down; but produces a few shoots upon the crown, from between the bark and wood; in course the next cut is a little higher; and so are the successions, until the stems get four or five feet high: by this time, two-thirds of the Plants are gone, and the rest is half rotten. The produce of such woods is so coarse, as to be of little use but for fuel and a few knotty rails. There are no Undergrowths, so that no harm is done by cutting at any time: hence 1 conjecture the appellation of running. A gentleman, of my acquaintance, had one of these woods, and was wise enough to grub it up. (See page 88.) At the same time, he cut down a Beech grove, and planted a mixed plantation, in order to variegate the picturesque appearance. The produce as under.

In the year 1818, two hundred and fourteen trees of twenty-two feet meetings, sold at four pounds per load.

	Labour. £.	*s.*	*d.*	*Produce.* £.	*s.*	*d.*
Felling 4725 Feet, at 5*s.* per 100 feet, ...	11	16	3	378	0	0
65 Stacks of Cordwood, at 2*s.* 6*d.*	7	11	8	81	5	0
2812 Fagots making, at 2*s.* 4*d.*	3	5	4	28	2	6
2812 Fagot-bands getting, at 2*d.*	0	4	8			
	£22	16	11	487	7	6

These trees averaged twelve feet apart, or three hundred and two trees per acre; and the gross value, per acre, was six hundred and ninety-eight pounds four shillings, for forty years' growth, exclusive of three thinnings. They grew upon a marly sand, substrata chalk. The grove, treated of in page 242, grew entirely in chalk: hence this being as good at forty years, as that was at fifty.

Those who are fond of calculations, may find, by arithmetical progression, the annual progressive increase of timber as a data. Suppose the annual rings to be one-eighth of an inch thick, it will increase the diameter a quarter of an inch: then forty years' growth gives ten inches diameter: but the middle or mean girth of forty feet stems, was barely nine inches: and the last years' increase of timber, was something above a foot of round timber. Now, had one half of the above trees been thinned out, we might have calculated upon another forty years' growth from the same data; and the diameter would be nineteen inches, or fifteen inches and a half the quarter girt, which has increased the twenty-two feet up to seventy-one; and the last years' increase will be found to be above four feet of round timber, and the increase in value one-fifth; as Beech-trees, at fifty feet meetings, are more saleable, at five pounds per load, than those of twenty-two feet meetings are, at four pounds per load. I consider Beech grove timber, of this size, to be nearly at its consistency; as to size as well as quality: after which, it is in danger of becoming bibulous or spongy at the heart; as does the Arbeel: nor will it pay well for standing longer.

From another Beech grove was cut three hundred and thirty-six trees, which produced two thousand seven hundred feet, or eight feet meetings, and sold at six pounds five shillings per hundred feet.

	Labour. £.	s.	d.	Produce. £.	s.	d.
Felling at 5*s*. per 100 feet, ...	6	15	0	178	15	0
2070 Fagots making, at 2*s*. 6*d*. .... Getting Fagot-withs, at 2*d*.	2	5	3	21	14	8
84 Bundles of Pease-sticks, at 1*d*.	0	7	0	2	2	0
25 Stacks of Cordwood. $12 \times 3 \times 3 = 108$,...	3	0	3	30	0	0
	£12	7	6	232	11	8

These trees stood at an average of nine feet apart, or five hundred and thirty-seven trees per acre; and the gross value was three hundred and seventy-one pounds seven shillings and six-pence.

The crooked butts of the same trees, that would not do for cleaving into rails, were cut into three feet lengths, for compass work; as kirbs and cart-wheel felloes, at from eight to ten inches diameter. Fourteen of them, laid side by side, and four courses high, measured just three cube yards. Now, as four cube yards are a stack, worth twenty-five shillings, seventy-four of these felloes will make a stack. One hundred of them sells at seventy shillings, which is nearly cent. per cent. better than converting them into Cord or Stackwood. They contain one foot of wood each, round measure: in course they weigh eighty pounds each, and each length makes two felloes. N. B. A foot of round timber, green, must be just forty-eight inches in circumference; for, if measured as timber merchants measure, it would weigh ninety pounds: difference, as nine is to eight. As the circumference of their feet is fifty-two inches, the diameter sixteen inches and six parts, and the contents two thousand five hundred and sixty-eight cube inches; compared with a cube foot is, as twenty-one to fourteen,

A foot of round timber, close measured, is forty-eight inches in circumference; its diameter, sixteen inches; and its contents, two thousand two hundred and four cube inches; compared with a cube foot of one thousand seven hundred and twenty-eight is, as twelve to nine.

CHAP. XLII.

FRAGMENTS.

IT may seem strange, that I omitted woods pruning. I considered prunings, after thinnings, quite sufficient. The winter of 1813—14, was a hard one; and labour, very scarce. I gave some poor men leave to prune in Stanstead Forest, in a neglected part of forty-five years' growth. There was no Underwood. They found their own saws and ladders. I furnished each man with a leather strap, nine inches long, with the injunction not to saw off a limb or branch, without first cutting the under-side, to prevent tearing the bark; nor to cut any branch that the strap would not girt, on pain of forfeiting the job: and where a branch came out of a tree, without a swell, to cut such off close; but where there was a swell, then to cut at the smallest part: nor was any tree to be pruned higher than two-thirds of its whole height. Four men pruned an acre per day, and made seventy-five fagots, worth fifteen shillings and nine-pence. I consider any pruning, after trees are forty or fifty years old, to be injudicious: yet, I have seen, in my travels, trees, that have got to a state of consistency, pruned close; where some of the wounds were so large, that the pruner's shoe would not cover them. Had they been skilfully taken off, they might have been covered by the palm of his hand. This has originated in mistaking MR. PONTEY'S close pruning; for, I am sure, he never meant to be understood so as to make the wound larger than was necessary. When are such wounds to be healed? I say, never: for, the efforts of nature will be in proportion to the vigour of the patient, to heal the cicatrice or wound. When trees are said to be at a state of consistency, viz. nearly done growing, it is to be understood, that the parenchyma has nearly lost its elasticity; therefore, the effort to incarnate, or heal the wounds, will be very weak.

It is not the sap that heals wounds, but the expansion of the parenchymous substance. It is this which forms the cleft grain of wood, that runs from the Core or Corona to the bark; and the felt-grain is formed by the concentric circles, or annual rings; by which, lath-renders cleave their laths.

MR. EVELYN tells us, "It is easier to make a good planter, than to find one." He might have added, "or an arborator:" and I think there is skill required by gentlemen, in choosing such.

I surveyed some plantations in Dorsetshire; the proprietor of which, had promoted a favourite domestic to be his *Factum Factotum*, who had managed the plantations fourteen years, or mismanaged them; so that Oak and Spanish Chesnut were lost, and many bare places of some rods made, by thinning; and the Firs were pruned, or rather lopped cautiously, to prevent their bleeding, by cutting off the branches, at six or eight inches from the stem; as if growing *Chavaux de Frize*, for Weymouth barracks.

I forbear further comment, and refer my reader to MR. PONTEY'S Forest Pruner. His Lecture, upon Knotty Timber, is worth all that the book costs, to those concerned in training trees for timber.

Branches of trees come out, generally, at an angle of forty-five degrees; and, as they grow longer, their own weight bears them down. This should be particularly attended to, in the thinning of woods; or else the trees will be left too near each other. I consider the erect position of trees, to arise from the light and air being equally distributed on all sides. When shoots happen to come out at an angle of less than forty-five degrees, they directly enter into a competition with the leading shoot; and they should be taken off; for, if they are allowed to grow, the tree becomes forked, and the parenchyma so much cramped between them, that it cannot expand sufficiently; but becomes fluted or concave, for some height above the forked place. These flutes, MR. PONTEY calls "Troughs, formed by the sap being interrupted." As there is no circulation of sap, there can be no interruption. Take a forked tree, and cut off the forks above the forked part; and it will shew the Corona or Core to be not in the centre of each limb, but near to the sides, that are nearest each other; which proves the troughs or flutes to be a natural consequence, for want of room for the parenchyma to expand. "Tapering trees," he also says, "are caused by the interruption of sap; the tops being robbed of it by the lateral branches."

I was once in a Canal-Lockhouse, conversing with the Lock-master; when he abruptly turned to the door, saying "There is a boat coming, and I must fill the lock." I asked him how he knew; he said, "By the splashing of the water over the lock-gates:" for, the instant the boat left the upper lock, the water dashed over the gates; although, the upper lock was at a mile distance. It occurred to me, that, if that mile were a summit level, and a laden boat let down from a branch canal, in the middle, the agitating expansion of the water would be the same at each end, at the same time. This, I conceive to be precisely the case with the sap in trees, in spring. It is true, there are no canals in trees; nor is there any circulation: if there were, there must be veins; and a tree might be drawn dry, or to death: yet, both must be replenished: the canal, by water from the higher ground; and the tree, from the earth by means of the bark, and not the roots. It is the bark on the roots, which collects the water that ascends up the bark to the stem, through its reticular or net-like web. This is imbibed by the parenchyma and lignous substance; by which, it is prepared and assimilated to the nature of sap: and when thus prepared and united, the vernal sun causes it to expand; which produces a glutinous kind of perspiration, that flows between the bark and the tree; as the water in the canal, to both extremities. The bark acts to the sap; as the banks of the canal confine the water. The descending sap produces an elongation of roots; and the ascending sap, an elongation of shoots: after this, the annual rings of wood, that thicken the tree, are formed; and the thickness of them is governed by the quality of the earth. A sandy loam admits of the most free range for the roots; as well as free ascent of evaporation of the gases up to the leaves.

It is proved, by the experiments, (page 246,) that the stems of trees never begin to swell, until the leaves are fully expanded.

In the year 1818, I was desired to examine a mixed plantation, of seven years' growth, which was so rude, that the owner wished to have it corrected. It had got to be fifteen feet high. The Firs and Larch were so gross, that their tops had lost their pyramidal form, and become pendulous. I ordered them to be cut down, to make room for the deciduous trees: and when cut, I found, that the three last years' wood, or rings, measured one inch; consequently, the diameter of the trees had increased two inches in three years. The soil was a fine sandy loam, enriched by a marshy stagnant ditch, which allowed the roots to push too far in the spring: and, it also allowed of the extraordinary expansion in the parenchyma and lignous substances: hence it is, that roots make such wonderful progress, when they get into a drain or water-pipe.

Tapering Trees. The tops of tapering trees may be considered as a distinct tree growing upon another tree; and compared to one, planted in a stubborn, hard loam, that will not admit of a free range for the roots to collect a sufficient quantity of moisture. The cause is obvious; and the cure, easy. Take off all the strongest lateral limbs; and the good effect will soon be observable in the tapering top; as it will furnish itself with shoots, alias caterers, higher up, that will feed its stem.

Shaken timber, in woods, I have already proved to be by carters driving over them; and trees falling upon them; so as to rupture the cleft grain. In Saplings, the effect is not seen, until the trees become aged. Shakes, in single trees, are by the wind. The power, that strong winds have on full-headed trees, is most astonishing. In the year 1817, there was a whirlwind that traversed an orchard of Black Cherry-trees, at Denham, near Uxbridge. It twisted off two trees, at a foot above the ground; as if they had been composed of straw. One was fourteen inches diameter; and the other, eighteen, at the fracture.

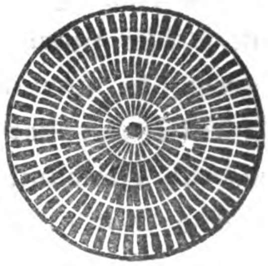
A French author has written of a frost having cleft thousands: and, that he heard them split by tremendous crashes. This I doubt; and believe he trusted to his ears, instead of examining, or appealing to reason. I have heard such crashes in woods, in hard frosts: but they have been caused by ice and snow freezing on the limbs, and falling by the next day's sun. If frost split trees, "Would any escape in our climate?"

Tall Trees. Our tallest trees are always found in the deepest vales: as there it is, the vaporous gases ascend the highest, to feed the highest shoots of trees: and there it is, that moisture, from the earth, can be attracted and sent to the greatest height by the bark; with the assistance of the weight of the atmosphere, which is very powerful in vales, and light on hills, in proportion to their elevation: thus proved.—When I first came here, I made myself a barometer, in the usual way, placing the scale at the medium of twenty-eight to thirty-one inches. The first stormy wet weather after, I found the mercury had sunk a quarter of an inch below the scale. I had forgot that I was one thousand and twenty-two feet above sea level. (See page 12.)

This chapter would admit of much amplification; which

I leave to the learned and industrious curious, who will feel a pleasure in contemplating the growth of wood.

Wood, in a state of decomposition. Where the stool of an old Oak remains seven or eight years, it assumes the appearance of the annexed figure.



The circles of black represent the yearly increase of wood. The white radiated lines represent the parenchyma and cleft grain. The concentric white circles represent the parenchyma or fleshy substance; also, the felt-grain. In an old Oak-stool, or the top of an old Oak gate-post, the parenchyma is sunk; and the black circles represent the lignous or woody part; standing not unlike the circular ornaments in old mosaick pavements.

A NEW AND EASY METHOD OF ESTIMATING THE QUANTITY OF TIMBER IN ANY TREE; NO MATTER WHAT FORM IT GROWS IN.—Get to a convenient distance; and keep changing your position, until the height of the tree seems to be equal to the distance you are from the tree: then measure, or pace that distance: suppose it to be twenty paces; which will give sixty feet, for the height of the tree: then, with a string, take the circumference of the tree, at five feet from the ground; double the string, and reject one-half; the other half gives the mean or average circumference: that doubled four-fold, is called the girt, or side of a square, equal to it: suppose eleven inches; and the height sixty feet; which will give a load of fifty feet.

I estimated fifty Beech-trees, in the same manner, which amounted to three thousand and thirty-two feet. (Total height of the trees is taken into estimation.) I then felled the whole, and measured them the usual way; and the amount was three thousand seven hundred and ninety-two feet; just one-fifth more than the estimation. (See page 38.) These fifty trees produced sixty-two cords and a quarter of Cordwood. And two thousand two hundred and seventy-four fagots, green, weighed forty-five pounds each; or two tons per hundred: so that the total weight, or average, may easily be ascertained.

Timber Valuing. The top and lop being allowed the buyer, for felling, peeling, and cartage; without making any allowance for the thickness of the bark.

It may be learned, by inspecting the 98th page, that from nine-pence to one shilling per foot may be added for the bark.

Number on trees.	Lengths.	Girts.	Contents.	Total Contents.	Under ten.	Ten to twenty.	Twenty to thirty.	Thirty to forty.	Forty and upwards.
1	24	13	28	28	-	-	28	-	-
2	24	9½	15	15	-	15	-	-	-
3	21	9	12	12	-	12	-	-	-
4	19	17½	40	40	-	-	-	40	-
5	16	17	32	32	-	-	-	32	-
6	14	10	10	10	10	-	-	-	-
7	18 18	11 9	15 10	25	-	-	25	-	-
8	26	12	-	26	-	-	26	-	-
9	30	15	-	35	-	-	-	35	-
10	20	14	-	27	-	-	27	-	-
11	17	17	-	34	-	-	-	34	-
12	25	16	-	44	-	-	-	-	44
13	16 16	13 11	18 13	31	-	-	-	31	-
14	13	8	-	6	6	-	-	-	-
15	15	18	-	34	-	-	-	34	-
16	22	16	-	39	-	-	-	39	-
				438	16	27	106	245	44

			£.	s.	d.
2 Oaks, ...	16 feet,	at 3s. per foot, ...	2	8	0
2 do.	27 do.	at 3s. 6d. do.	4	14	6
4 do.	106 do.	at 4s. do.	21	4	0
7 do.	245 do.	at 4s. 6d. do.	55	2	6
1 do.	44 do.	at 5s. do.	11	0	0
16 Trees, ...	438 feet,	....	£94	9	0

This is sufficient as a specimen.

In this fall, there was a tree, whose top was eight feet long, and twenty-eight inches in circumference, shaken quite through. This rupture was caused twenty years back, viz. in the last fall, by the top of its sire, or grandsire falling upon it. This can never take place, when trees are nearly of a size. It had a woodpecker's hole in it. They never peck into sound trees; but always into those that have grubs in them.

This specimen, of a wood-valuer's book, has nothing to do with first-rate Oaks in a park, whose ample heads render the bark thereon, and the measurable timber, in some trees, worth twenty pounds a load.

In valuing Beech, no allowance is ever made for its bark, on account of its thinness: as in Oak, it is to be valued in four classes.

1st. Large or first-rate Oak, called merchant or market-timber, worth from two shillings to two shillings and six-pence per foot.

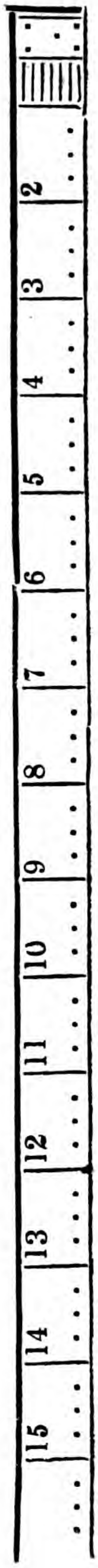
2nd. Plank-timber for ships, worth one shilling and nine-pence per foot.

3rd. Rail-timber for the north, worth from one shilling and three-pence to one shilling and six-pence per foot. (I should suppose the new projected rail-roads will increase the demand, so as to improve the value.)

4th. Fence-rails, &c., worth from nine-pence to one shilling per foot.

Although Beech is worth only half the price of Oak, it will, on chalk-land, buy a horse, whilst Oak buys a saddle.

In valuing Elm and Ash, all under twelve inches girt, half an inch is allowed for bark; and all above twelve inches, one inch is allowed for the thickness of the bark. The valuer should have a small hatchet; paint and brush, for numbering the trees; a ladder; a ten-feet rod; and a leather strap, with a brass plate, rivetted upon the unit end. This weight enables the measurer to cast the strap round the trees, which are too thick to fathom. The strap should be marked as per figure, and four inches between each number; which will give the girt, without folding in inches and quarters.



Thus, a strap, five feet long, gives fifteen inches girt, or one-fourth.

To measure and value poles, from herdle-poles to timber. Suppose eighty pounds to be the standard weight of a foot of green timber, round measure. The herdle-poles, in page 243, weigh twenty pounds each; in course, one hundred will contain twenty-five feet, at eighteen shillings, namely, eight-pence half-penny per foot. A cord of such straight stuff contains fifty feet, worth twenty-five shillings; so that two-pence halfpenny per foot is gained in favour of poles. (See Cordwood, page 137.) By this, the woodreef will know when the prices offered for small poles, are preferable to cording: and the following table of under timber measure, will shew, by inspection, both the quantity and value, without any charge on memory.

We suppose, now, the poles are drawn out to a convenient place for loading, after the sale; all classed ready; the woodward having his book ruled as per table; he takes the above strap, with a five-feet rod, and two assistants; he

takes the lengths and girts in
standing, one at each end of
poles, as measured, until the
be a waggon-load each, by e

In order to make the tabl
run it up to thirteen inches

Girts.	Length in cube feet.	
	ft.	*pts.*
2	36	00
2½	23	00
3	16	00
3½	11	75
4	9	00
4½	7	11
5	5	7[illegible]
5½	4	[illegible]
6	4	[illegible]
6½	3	[illegible]
[illegible]	2	[illegible]
[illegible]	2	[illegible]

[illegible]

[illegible] [illegible]
[illegible] [illegible]
[illegible]
[illegible] [illegible]
[illegible]

[illegible]
[illegible]

[illegible]

takes the lengths and girts in the middle; the assistants standing, one at each end of the lot, and throws off the poles, as measured, until the lot is done. The lots should be a waggon-load each, by estimation.

In order to make the table of more general use, I have run it up to thirteen inches girt.

Girts.	Length in cube feet.		Value per foot.		Feet run per load.	Value per load.		
	ft.	*pts.*	*s.*	*d.*		*£.*	*s.*	*d.*
2	36	00	0	9	1800	1	17	6
2½	23	00	1	0	1150	2	10	0
3	16	00	1	3	800	3	2	6
3½	11	75	1	6	587	3	15	0
4	9	00	1	9	450	4	7	6
4½	7	11	2	0	356	5	0	0
5	5	76	2	3	288	5	12	6
5½	4	76	2	6	238	6	5	0
6	4	00	2	9	200	6	17	6
6½	3	40	3	0	170	7	10	0
7	2	92	3	3	146	8	2	6
7½	2	54	3	6	127	8	15	0
8	2	15	3	9	108	9	7	6
9	1	77	4	0	89	10	0	0
10	1	44	4	3	72	10	12	6
11	1	28	4	6	64	11	5	0
12	1	00	4	9	50	11	17	6
13	0	85	5	0	42½	12	10	0

2 gives 36 in length to a foot.
2½ gives 23 do. to a cube foot.
3 gives 16 do. And so on for the rest.

N. B. This may, to some, seem above the market prices;

but each class is considered to be what valuers term "ends," or "butts without any tops:" and all poles, above three inches girt, are cut so as to measure three inches diameter, at the small end: and all trees, above six inches girt, are called timber; and the tops are cut off so as to measure seven inches diameter.

The following is a ready reckoner for fagotting, at two shillings and nine-pence per hundred; and the value, at twenty-one shillings, from one fagot to fifty.—

Fagot making.					Value.		Fagot making.					Value of fag.		
No.	*s.*	*d.*	*f.*	*pts.*	*s.*	*d.*	*No.*	*s.*	*d.*	*f.*	*pts.*	*s.*	*d.*	*pts.*
1	0	0	1	32	0	2½	26	0	8	2	32	5	5½	2
2	0	0	2	64	0	5	27	0	8	3	64	5	8	4
3	0	0	3	96	0	7½	28	0	9	0	96	5	10½	6
4	0	1	1	28	0	10	29	0	9	2	28	6	1	8
5	0	1	2	60	1	0½	30	0	9	3	60	6	3½	10
6	0	1	3	92	1	3	31	0	10	0	92	6	6	12
7	0	2	1	24	1	5½	32	0	10	2	24	6	8½	14
8	0	2	2	56	1	8	33	0	10	3	56	6	11	16
9	0	2	3	88	1	10½	34	0	11	0	88	7	1½	18
10	0	3	1	20	2	1	35	0	11	2	20	7	4	20
11	0	3	2	52	2	3½	36	0	11	3	52	7	6½	22
12	0	3	3	84	2	6¼	37	1	0	0	84	7	9	24
13	0	4	1	16	2	8¾	38	1	0	2	16	7	11½	26
14	0	4	2	48	2	11¼	39	1	0	3	48	8	2	28
15	0	4	3	80	3	1¾	40	1	1	0	80	8	4½	30
16	0	5	1	12	3	4¼	41	1	1	2	12	8	7	32
17	0	5	2	48	3	6¾	42	1	1	3	44	8	9½	34
18	0	5	3	76	3	9¼	43	1	2	0	76	9	0	36
19	0	6	1	8	3	11¾	44	1	2	2	8	9	2½	38
20	0	6	2	40	4	2¼	45	1	2	3	40	9	5	40
21	0	6	3	72	4	5	46	1	3	0	72	9	7½	42
22	0	7	1	4	4	7½	47	1	3	2	4	9	10	44
23	0	7	2	36	4	10	48	1	3	3	36	10	0½	46
24	0	7	3	68	5	0½	49	1	4	0	68	10	3	48
25	0	8	1	0	5	3	50	1	4	2	0	10	6	0

USE OF THE TABLE:—For 100 of fagots, double the 50 or last number. 1*s*. 4½*d*. gives 2*s*. 9*d*. and so on for any quantity.—

			s.	*d.*	*f.*	*pts.*	
Suppose 85 fagots:	take for 50	....	1	4	2	0	making.
	30	....	0	9	3	60	
	5	....	0	1	2	60	
	85	....	2	4	0	20	

			s.	*d.*
Suppose 76 fagots, at 21*s*. per 100:	take for 50	....	10	6
	20	....	4	2¼
	6	....	1	3
	76	....	15	11¼

As a further proof of the power of the sun acting upon the parenchyma, see page 144; where the meridional rings in an Oak are one-fifth larger on the south side, than on the north side.

Hot and dry summers are bad for herbaceous Plants and small Shrubs; but promote the growth of trees.

It was a pernicious assertion of Mr. Hunter's writing against planting, in favour of sowing for woods or Coppices, on pretence of preserving the tap-roots.

Lateral roots of planted trees, will always go deep enough to protect the tree from drought, or injury by winds. This is proved by hedge-row trees upon high banks.

The Newspapers inform us, that there has not been so dry and hot a summer as this, (1826) since the year 1762. See now what effect it has had upon trees. My trees have been planted from three to six years from the nursery; and this summer's shoots are in length as follows:—Oak, Spruce and Scotch Firs, one foot and a half; Spanish Chesnut-tree, two feet; Beech and Elms, two feet and a half; Lime-tree and Sycamores, three feet; Larches and Arbeels, three feet and a half; Lombardy and White Poplars, four feet and a half; Italian Black Poplar, five feet; Elder-tree, seven feet; and a cut-down Huntingdonshire Willow, from the stool, seven feet and a half. I have others of a larger size, planted six years ago, (they were from twelve to fifteen feet high when planted) in holes, dug from one to two feet deep, in order to resist the winds, and they have not grown one foot in six years; whilst trees, of the same size and varieties, from the same place, at the same time, and planted in the same ground, have doubled and tripled their weight in six years, by being planted with their roots near the surface, and tumped. (See page 222.) Thus, tumping effectually secures them against all winds, but not against sheep biting the bark, nor of cows rubbing it off. Two or three wheelbarrow-fulls of stones or bricks, walled upon the tump, around the tree, at six or seven inches distance from the tree, and the inside filled up with earth, will protect the tree from windgalls, sheep, bullocks, and deer. To guard against horses biting trees, no substitute will do for the usual guard of three posts paled.

Summer is past: our business will be planting again after the fall of leaf.

I have brought this work down to something like a finis or autumn, but cannot lay down my pen, until I have stated my observations upon the fall of leaves.

Woody Plants keep swelling, so long as their leaves are healthy, or the weather sufficiently warm to keep the parenchyma, sap, and aerial gases in motion: afterwards, the leaves of the deciduous tree sicken into various beautiful tints, whose colours are governed by the acids in the sap: thus, in the autumn, the leaves die and fall off like ripe fruit. They fall off at the articulation-joint or coarcture, formed by nature for the purpose; in which, are delicate little fibres running reciprocally from the bark and leaf.

This is evident to the naked eye, by examining the beam-end of a deer's horn, newly dropped, or footstalks of large fruit, as melons, pears, &c. As autumn approaches, the whole substance shrinks, so as to disengage the said fibres of both fruit and leaves. Examine stone-fruit in a green state, how the pulp adheres to the stone, the acorn to the cup, the hazel-nut to the husk or receptacle; taste them in that state; how astringent, and what an acid! The sap in spring, after the watery fusion, takes the vinous fermentation, and, in the course of the summer, throws off the tartar and other matter into the wood, bark, fruit, and seeds. The sap has lost its vinous astringency, then, as above stated, down falls the fruit and leaves, and the tree stands dormant, until revived by the vernal sun, the following year. We frequently see young trees retain their leaves, until pushed off by new ones, particularly Beech. The cause is, by the Plants being stunted in hedges, or by removal, have made two or three years weak shoots; but on recovery, the flow of sap is vertical, and pushes up vigorous young shoots, leaving the wretched, poor, languishing, weak lateral shoots to perish: hence their retaining their leaves; as cattle, starved and hunger-bit, cast their coats in summer, instead of spring.

All Evergreen Shrubs, in our climate, are slow growers, with a viscid thick sap, as Holly or Ivy; or with but little, as the Yew and Box. Our Evergreen Trees are quick growers, and have a resinous sap. All Evergreens retain their foliage to the third, fourth, and some to the fifth year; when the module or thickness of the wood gets too large for the coarcture of the footstalk of the leaf, it is thrust off about midsummer; as does the Ivy.

The Larch, though a resinous Plant, is a deciduous Plant.

The Cedar of Lebanon is not a resinous Plant, yet, like the dry Box, it is an Evergreen; therefore, we must look up to our philosophical chemists, to determine what kind of salts the sap of Evergreens contains, thus to retain their leaves, or cause snow-drops to bloom at such inclement seasons.

FINIS

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INDEX.

L. l.

ERRATA.

Page 7. 2220 in the right hand column belongs Ben Nevis.
——, line 12 from the bottom, for *No.* 1 & 5, read 1*a*.
—— 8, line 24. Reject the word *he*.
—— 9, line 14. *Moors* read *mores*.
—— 14, line 10. *Hailstones* read *hailstorms*.
—— 19, line 7. *Cutlings* read *Cuttings*.
—— 30, line 25. *Poles* read *pales*.
—— 33, line 12. *Two hundred* read *two thousand*.
—— 46, line 5. *Pruning* read *punning*.
—— 55, line 7. Read *grow, is in the bed*.
—— 69, line 7 from the bottom, is a superfluous *a*.
—— 73, line 4. *And* is superfluous.
—— 90, line 24. Read *cut one off close*.
——100, line 1. 163 read 1063.
——144, line 1. *Honey-daws* read *honey-dews*.
——162, line 24. *Support* read *supply*.
——163, line 19. The *a* before service is superfluous.
———line 26. *With the same* read *with some*.
——191, line 34. *Rural foliage*. read *rural foliage in summer*. *It &c.*
——199, line 7. *Maritine* read *maritime*.
——207, line 3. *Storms* read *stones*.
——196, line 18. *Are* read *when*.
——235, line 7 from the bottom. 100 read 38, 137, 190.
——251, line 19. *Are* read *is*.
——255, line 2. 242 read 190.
——264, line 12 from the bottom. *Oak* read *Beech*.

N. B. A careful perusal of the pages from 160 to 166, will naturally lead to an idea, that deep planting is bad, as the parenchyma cannot act in the roots so powerfully, as in the roots of trees that are near the surface of the earth, which enables them, by the warmth of the sun, to act reciprocally with the stem and branches, and puts the tree into a perspiration; and that perspiration pushes up the young shoots annually.

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